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### IMPORTANT NOTIFICATION

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Applicant

NOKIA NETWORKS OY et al.

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Applicant NOKIA TELECOMMUNICATIONS OY et al	

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<u>Priority date</u>	<u>Priority application No.</u>	<u>Country or regional Office or PCT receiving Office</u>	<u>Date of receipt of priority document</u>
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1. The following indications appeared on record concerning:

- ☒ the applicant
 ☐ the inventor
 ☐ the agent
 ☐ the common representative

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2. The International Bureau hereby notifies the applicant that the following change has been recorded concerning:

- ☐ the person
 ☒ the name
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 ☐ the nationality
 ☐ the residence

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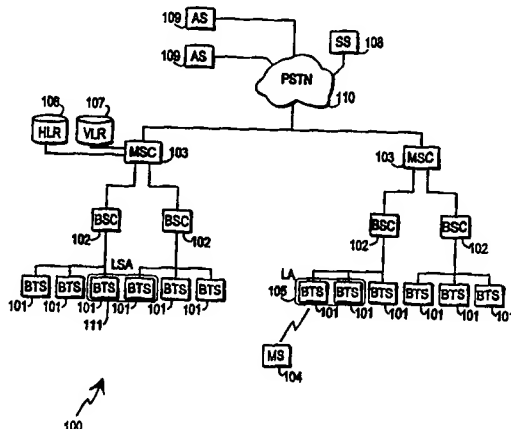
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## (57) Abstract

A communications system (100, 300) comprises base stations (101) for providing mobile stations (104) with communications links. It comprises at least one localized service area (111) and means (108, 109) for changing the service selection offered to a given mobile station on the initiative of the communications system. The change is realized in response to information (203) indicating the arrival of the mobile station in said localized service area.

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## METHOD AND SYSTEM FOR EXPLOITING LOCATION-DEPENDENT SERVICES IN A CELLULAR RADIO SYSTEM

The invention relates in general to the provision and delivery of services offered by a network to a mobile station. In particular the invention relates to the utilization of  
5 information concerning the location of a mobile station for the purpose of providing services.

A modern communications network provides mobile station owners with individual programmable services. A digital telephone network is one such network. Services known to be provided by it include programmable call transfer and voice mail system, which usually are implemented at a switching center. Networks are also known  
10 in which certain services are provided by an outside service provider who pays to the communications network operator for the use of their network, and the services provided by said service provider are located physically elsewhere than at switching centers. This patent application uses a digital cellular radio system as an example of  
15 a communications network.

In known networks the provision of services has not depended on the part of the network the user is located in when he places a call to an apparatus or equipment providing a service. According to a recent proposal, however, different locations can be specified for a mobile station in a network. Then, as a mobile station is registered in a cell, the service that it receives may be different according to its location.  
20 However, it would be advantageous in various situations if different services could be offered to the user according to his physical location on the initiative of the network, without the mobile station actually establishing a connection to the network. Such services are called network initiated services, and they include so-called  
25 push services in which an apparatus connected to the network sends data to mobile stations without the mobile stations requesting said information. An example of a locally arranged push service which cannot be implemented using prior-art solutions is to send the day's menu at a cafeteria of a company to the mobile stations of all those employees who are within the premises of the company as lunchtime is  
30 approaching.

An object of the present invention is to provide a method and system for making services provided by a network available to the user in various ways depending on the location of the user.

The objects of the invention are achieved by storing in the memory of the mobile station the information on the basis of which it recognizes that it is situated in a given localized service area and by programming the mobile station such that in response to such recognition it sends an appropriate message to an apparatus that provides services.

The invention pertains to a communications system that comprises base stations to provide mobile stations with communications links. It is characterized in that it comprises at least one localized service area and means for changing the service selection offered to a given mobile station on the initiative of the communications system in response to an indication that the mobile station has arrived in said localized service area.

The invention also pertains to a cellular mobile station that comprises a control block and storage means. It is characterized in that its storage means are adapted so as to store the information required to recognize a given localized service area whereby the mobile station is arranged so as to send – in response to the recognition of a localized service area – a notification of its arrival in the localized service area, said notification being intended to function as an impulse for changing the service selection offered to the mobile station.

The invention further pertains to a method for changing the service selection offered to a mobile station in a communications system that comprises base stations for providing mobile stations with communications links. The method is characterized in that it comprises steps in which

- information is generated about the arrival of a mobile station in a localized service area, and
- the service selection offered to said mobile station on the initiative of the communications system is changed.

In accordance with the invention, localized service areas (LSA) are defined for mobile stations, which areas may be purely geographical or may have some other criteria. In addition to or instead of the geographical definition a localized service area may be defined e.g. in chronological terms. "Geographical definition" means generally definitions associated with a place or area: a localized service area may comprise a base station cell, several cells, a location area (LA), a public land mobile network (PLMN), an area defined by coordinates, certain cell identifiers, or an area in which base stations send to mobile stations some other identifier. Combinations of these alternatives may be used, too.

- Information about how a mobile station can recognize that it is in a given localized service area is stored in the memory of the mobile station. Since services are usually in a way or another associated with the subscription contract in which the user is given certain user-specific rights to use the communications network, it is preferable to store the information relating to the recognition of a localized service area in the user's SIM (subscriber identity module) card or a corresponding memory means intended specifically for the identification of the user independent of the apparatus used. In response to a positive identification the user's mobile station sends a message addressed to an apparatus responsible for providing localized services in the network. With this message the mobile station tells that the user is in a certain localized service area. On the basis of the message the network can offer to the user just those services that are needed in that localized service area. When the mobile station moves elsewhere, it sends a similar message telling that it is leaving the localized service area. The network may also automatically deduce that the mobile station has left the area as a certain condition is met. Such conditions include e.g. that
- the mobile station does not respond to the next paging message or another message sent in the localized service area in question,
  - the mobile station does not acknowledge a data packet addressed to it,
  - the mobile station does not in a certain period of time renew its message of arrival in the localized service area, or
  - the mobile station does not in a certain period of time send another message that must be sent periodically, such as the periodic location update (PLU) message, for example.
- The apparatus, to which the mobile station addresses its location message, may be maintained by the network operator or a service provider. The message may be an SMS (Short Message Service) message, an unstructured supplementary service data (USSD) message, a DTMF-coded (Dual Tone Multi-Frequency) message sent in conjunction with an ordinary call, or a data call. In response to the message the apparatus, to which the mobile station addresses its location message, may e.g. send information about the area in question to the mobile station or start the regular or periodic sending of such information, which goes on until the mobile station leaves the localized service area. Furthermore, the apparatus providing the services may activate or inactivate another localized service, send information about the location of the mobile station to other apparatus which need that information in their operation, or carry out some other function. One option is that mobile stations are assigned certain localized service profiles which may comprise various factors from



call pricing to data rates of data calls or to priorities of call establishment and management. The application of the service profile is in that case based on the location of the mobile station in a given localized service area.

5 The invention is below described in more detail with reference to the preferred embodiments presented by way of example and to the accompanying drawing in which

- Fig. 1 shows a communications system according to the invention,
- Fig. 2 illustrates the exchange of messages in the communications system according to Fig. 1,
- Fig. 3 shows a second communications system according to the invention,
- 10 Fig. 4 shows a mobile station according to the invention, and
- Fig. 5 shows an embodiment of the method according to the invention.

Fig. 1 shows a cellular radio system 100 which in a known manner comprises base transceiver stations (BTS) 101, base station controllers (BSC) 102 and mobile switching centers (MSC) 103. A mobile station (MS) 104 is connected via radio to at least one base transceiver station 101 so that the system considers the mobile station to be located in that location area (LA) 105 to which the coverage area, or cell, of that particular base transceiver station belongs. A location area may comprise one or more cells. For the purpose of maintaining location data of mobile stations and routing calls the system includes home location registers (HLR) 106 and visitor location registers (VLR) 107 which usually are located at mobile switching centers. In the system according to Fig. 1 a service server (SS) 108 and application servers (AS) 109 are also connected to the cellular radio network through wire links. Connections from the cellular radio network to servers 108 and 109 may be either direct, in which case the servers are in a way part of the cellular radio system, or routed via the public switched telephone network (PSTN) 110. Direct connections will be used mainly when servers 108 and 109 are maintained by the same operator who is responsible for the operation of the cellular radio system.

A prerequisite for the operation according to the invention is that somehow a piece of information is generated indicating that a mobile station is located in a certain designated localized service area 111. As was mentioned above, a localized service area may be the same as a given location area but nothing prevents from defining localized service areas completely differently; in Fig. 1 the localized service area 111 includes base transceiver stations under two different base station controllers.

35 According to a first embodiment of the invention, however, a service area always comprises a certain cell or certain cells. If the coverage area of a base transceiver

station can by means of directional antennas be divided into cells or blocks smaller than the central cell around the base transceiver station such that the system can make a logical distinction between those cells or blocks, then these smaller areas can also be utilized in defining the localized service area. The information about the location of a mobile station in a service area can then be generated either at the mobile station, which is regarded as the more preferable embodiment, or in fixed parts of the system. A limitation of the latter option is that since known cellular radio systems maintain mobile station location data only with the accuracy of a location area, defining a localized service area smaller than one location area would call for changes in the operation of the system.

Let us then assume that the information about the location of a mobile station in a localized service area is generated at the mobile station itself. To that end there exist several known methods which usually are based on the fact that every base transceiver station in known cellular radio systems sends general control information that can be received in the whole cell area and which e.g. comprises the unequivocal identifier of the base transceiver station or some other information characteristic of the base transceiver station. A method for detecting base station specific identifiers has been stored in advance in the mobile station. In the simplest case the memory of the mobile station stores a list of the identifiers of the base transceiver stations the cells of which make a particular localized service area. By comparing the received identifier with the list in the memory the mobile station finds out whether it is located in a certain localized service area. According to an alternative embodiment only a certain mask is stored in the memory of the mobile station so that the mobile station uses the mask to select certain characters from the base station specific identifier to be examined. If the characters examined form or follow a certain pattern the base station cell belongs to a localized service area. An advantage of this embodiment is that if the communications capacity of the localized service area is increased by establishing a new base station in the area, there is no need to separately send the identifier of the new base station to each mobile station to which the localized service area has been assigned; it suffices that the masked characters in the new base station identifier are the same as or corresponding to those of the other base stations in that localized service area.

According to a second embodiment of the invention a localized service area is not associated with base station cells but has certain geographic coordinates. In this embodiment a mobile station may detect that it is in a given service area e.g. in such a manner that each base station sends together with the general control information

information about the location of the base station in a geographic coordinate system. Having received the coordinates the mobile station may examine whether the point indicated by the coordinates is located within a localized service area assigned to the mobile station. In a more versatile method the mobile station may receive co-ordinates from all the base stations from which it can receive general control information, and assume that its own location is the average of the coordinates received. By comparing the location it has computed with the stored geographic definition of the localized service area the mobile station detects whether or not it is in the localized service area. Future mobile stations may include a GPS (Global Positioning System) receiver or some other means completely independent of base stations to determine the location of the mobile station in a geographic coordinate system. This makes it possible to define a localized service area completely independent of the cellular radio system cells.

According to a third embodiment of the invention, temporal dimension is also included in the definition of a localized service area. If a cellular radio system comprises cells A, B, C, D and E, it can be defined that a given localized service area comprises at all times cells A and B, but cell C only between 12 and 3 o'clock in the afternoon, and cells D and E on Wednesday, Friday and Saturday from 6 p.m. till 3 a.m. in the next morning. Naturally the temporal dimension may also be combined with the cell-independent geographic definition described above.

Fig. 2 assumes that the information about the location of a mobile station in a given service area is generated at the mobile station on the basis of a base station specific identifier received by the mobile station from the base station. The figure illustrates in a simplified manner the exchange of messages relating to the operation according to a preferred embodiment of the invention between a mobile station 104, base transceiver station 101, service server 108 and application server 109. The messages are depicted by arrows and their chronological order is from top down. Message 201 is a known general control information message sent by the base station to the mobile station, comprising a base station specific identifier. General information messages include e.g. information sent by base stations on the broadcast control channel (BCCH) in the GSM system. Block 202 refers to the comparison at the mobile station with an identifier list, or some other activity on the basis of which the mobile station detects that it has arrived in a certain localized service area. In response to that observation the mobile station sends to the service server a message 203 in which it includes an identifier characteristic of the mobile station, say an IMSI (International Mobile Subscriber Identifier) code or MS-ISDN (Mobile Sub-

scriber Integrated Services Digital Network) number stored in the SIM card of the mobile station.

- The invention does not limit the form of message 203. One advantageous option is to use an SMS message such that the mobile station reads from the memory the phone number of the service server and sends the SMS message to that number. A second option is to use a free-form data message specified in many digital cellular radio systems; in the GSM it is called an USSD message. The mobile station may also by itself establish a call connection to the service server and send the message 203 DTMF-coded or as a data call.
- 5     The role of the service server in the embodiment according to Fig. 2 is to maintain information about which mobile stations are in which localized service areas and which services should be offered to them accordingly. The actual service is provided by the application server. Having received message 203 the service server reads from its memory which services should be offered to the mobile station in that
- 10    localized service area and sends a service request 204 to the appropriate application server. The information about what services are provided by which application servers is also stored in the memory of the service server so that it can send the service request 204 to the correct application server. The invention does not limit the form of the service request 204. From the prior art it is known several methods
- 15    for realizing communication between two servers connected to a communications network.

In response to a service request 204 the application server provides the mobile station with a service, indicated in Fig. 2 simply by an arrow 205. The service is not necessarily a simple message and its commencement does not necessarily involve only information sent to the mobile station. A mobile station may have a whole service profile defined for it in a localized service area, including e.g.

25    -

- call pricing or prioritization,
- limitations concerning the modulation method, data rate and/or connection quality in the communication between the base station and mobile station,
- 30    -
- routing of incoming email messages to a mobile station instead of the user's desktop workstation, or
- activation or inactivation of automatic call transfer and/or voice mail service.

The mobile station may also have the right or obligation in a given localized service area to receive messages periodically e.g. with regard to the weather, traffic, stock exchange rates and so on. Thus the application server may at the stage represented

35    -

by arrow 205 establish connections in a versatile manner with various apparatus in the cellular radio system or in communication with the cellular radio system. On the other hand, the service server may have instructions stored in its memory to request services from more than one application server, in which case there would be  
5 several messages 204 sent to a plurality of application servers.

Fig. 2 further assumes that the mobile station leaves the localized service area in accordance with controlled cell reselection in which case it sends to the service server a notification 206 about its departure from the service area. In response to the departure message the service server sends to the application server a request 207 to  
10 terminate the service. The mobile station can send message 206 via the old base station always when leaving a cell belonging to the localized service area regardless of whether the new cell belongs to the same localized service area. In an alternative embodiment the mobile station checks always after a cell reselection whether it is still in the same localized service area, and if not, it sends via the new base station a  
15 notification about its departure to the service server. According to a second alternative embodiment mobile stations do not send departure messages at all but the departure of a mobile station from a given localized service area is detected by fixed parts of the system e.g. when a mobile station will not respond to a paging message or another message sent to it in that localized service area, or will not send the  
20 specified periodic location update message or some other mandatory periodic notification, or when the service server sends regularly or periodically to all mobile stations in a localized service area a short data message which must be acknowledged by the mobile stations; a failure to acknowledge the message indicates that the mobile station in question is no more in the localized service area.

25 Above it was disclosed that in a given localized service area a mobile station receives a certain service. However, service areas may be defined which are characterized in that a mobile station will not be offered a service that it would receive elsewhere. A mobile station may be assigned several service areas with different operating instructions for the different areas. The service server which the mobile  
30 station informs about its arrival in a localized service area may be always the same or different in some localized service areas. Alone the fact that whether or not a mobile station indicates its arrival in a localized service area and if so, how quickly it does it, may depend on the service area. The user may be given a choice about whether or not to give notification about his arrival in a localized service area. The  
35 mobile station may even inform the user that he has now arrived in a localized service area and ask for permission to send the notification of arrival. In connection

with the request for permission the user may be given a short description of the consequences of sending the notification of arrival. On the other hand, certain localized service areas may be defined by the network operator such that the notification of arrival is compulsory, whereby a mobile station has to send a notification of arrival every time that it arrives in such a localized service area regardless of what the user instructs the mobile station to do.

Above it was disclosed that the service server and application server are separate apparatus. However, these functions can be integrated in one device, whereby the communication between the servers as described above is reduced to communication internal to a server. One or both of them may also be implemented in connection with a known apparatus that already belongs to the cellular radio system. Servers can advantageously be integrated in mobile switching centers or base station controllers.

Fig. 3 shows a communications system 300 according to the invention, in which a localized cellular service (LCS) 302 operates under a public land mobile network (PLMN) 301 in an area with a high traffic density; the mobile switching center maintaining the service is called an LCS switching center (LCS-SC) 303. The LCS-SC operates just like a prior-art mobile switching center. It provides for the internal communication of the LCS and establishes, maintains and terminates connections between terminal equipment in the LCS and elsewhere. In connection with the LCS-SC there is a visitor location register 304 and a combined service and application server 305, which is called simply a server. In this embodiment of the invention the localized service area 306 covers all base stations operating under the LCS-SC (for simplicity, the base station controllers are not shown). Unlike above, the observation that a given mobile station has arrived in the localized service area is made in the fixed parts of the network, more specifically in the visitor location register 304. Let the cellular subsystem shown in Fig. 3 operate at an airport. Airline companies can provide the visitor location register 304 with the mobile phone numbers or other identifiers of their customers to whom certain benefits have been granted on the basis of their being frequent flyers, for example. As the visitor location register 304 detects that a mobile station associated with such an identifier has arrived in the area of the cellular subsystem, it sends appropriate information to the server 305. Instead of or in addition to the visitor location register other fixed network apparatus may take part in the sending of the message. In response to this information the server 305 starts sending to the mobile station announcements which are intended

only to privileged customers of the airline companies. The announcements are advantageously delivered as SMS messages.

In known digital telephone systems the sending of SMS messages is carried out via SMS service centers and not directly from an apparatus to another. However, for simplicity the SMS service centers are not included in the description above but their use is considered to be known to a person skilled in the art. Other messages described above may also be sent between apparatus via various known intermediary devices.

Fig. 4 shows simplified a control block and some memory parts of a mobile station according to the invention. The control block 401 is preferably a microprocessor which is located in the mobile station in a known manner such that data received by the mobile station, except for data intended to be presented directly to the user, is conducted from the receiver chain RX to the control block and, correspondingly, outgoing data produced by the control block is conducted to the transmitter chain TX of the mobile station together with the data coming directly from the user (say, digitized speech). In the mobile station according to Fig. 4 the control block has access to a fixed memory 402 and a removable memory unit 403, which is e.g. a smart card. The control block 401 also receives input from a keypad 404 and it outputs information on a display 405. A program executed by the control block 401 is stored in the fixed memory 402. Part of that program is an instruction to look for program extensions in the removable memory unit 403. For the operation according to the invention the removable memory unit includes a program 406 by means of which the mobile station is able to utilize localized service areas, as well as information 407, 408 about at least one localized service area (LSA1, LSA2). Fig. 4 assumes that the recognition of a localized service area is based on the mobile station comparing received base transceiver station identifiers (BTS ID) with a list of localized service areas stored in the memory. For each localized service area the removable memory unit 403 also includes a service server identifier (SS ID).

Fig. 5 illustrates the principle of a method according to a preferred embodiment of the invention in a mobile station, service server and application server. In accordance with block 501 the mobile station detects a cell reselection. It examines, block 502, whether any changes are occurring with respect to localized service areas, i.e. whether it is arriving in a localized service area (if until now it wasn't in one) or if it is leaving a localized service area (if until now it was in one). In accordance with block 503 the change triggers the sending of a message to a service server the operation of which starts from the reception of the message, block 504.

According to block 505 the service server examines whether the mobile station in question is on the list of those to be served. If the mobile station is arriving in a localized service area, it is in block 505 recognized as a mobile station which is to be served. If, on the other hand, the mobile station is leaving a localized service area, it is recognized in block 505 as a mobile station the services to which have to be terminated. A corresponding message is sent according to block 506 to an application server which receives the message in block 507 and determines in block 508 whether the message calls for the starting or termination of a service. The service is then either started 509 or terminated 510 for the mobile station, whichever the case may be.

The embodiments of the invention described above are naturally examples only and do not limit the invention. Communications systems, to which the invention can be advantageously applied, include e.g. second-generation digital mobile phone systems such as the GSM and its extensions, PDC (Personal Digital Cellular), D-AMPS (Digital Advanced Mobile Phone System) and PCS (Personal Communications Services) and future third-generation digital cellular radio systems such as the UMTS (Universal Mobile Telecommunications System) and IMT-2000 (International Mobile Telecommunications at 2000 MHz).



### Claims

1. A communications system (100, 300) comprising base stations (101) for providing mobile stations (104) with communications links, **characterized** in that it comprises at least one localized service area (111) and means (108, 109) for  
5 changing the service selection offered to a mobile station on the initiative of the communications system in response to an indication of the arrival of the mobile station in said localized service area.
2. A communications system according to claim 1, **characterized** in that it comprises a service server (108) to maintain information concerning the location of  
10 mobile stations in localized service areas and to generate requests for changing the service selection offered to mobile stations, and an application server (109) to provide mobile stations with different services in response to a request generated by the service server for changing the service selection.
3. A communications system according to claim 2, **characterized** in that said  
15 service server is the same as said application server.
4. A communications system according to claim 1, **characterized** in that it is adapted so as to change a localized service selection offered to a mobile station in response to a notification (203) sent by the mobile station on its arrival in a localized service area.
- 20 5. A communications system according to claim 1, **characterized** in that it is adapted so as to detect the arrival of a mobile station in a localized service area without the mobile station sending a special notification of its arrival in the localized service area.
6. A cellular mobile station comprising a control block (401) and memory means  
25 (402, 403), **characterized** in that said memory means are adapted so as to store the information (407, 408) required for recognizing a localized service area, whereby the mobile station is adapted so as to send a notification (203) of its arrival in the localized service area in response to the recognition of the localized service area, said notification being intended as an impulse for changing the service selection  
30 offered to the mobile station.
7. A mobile station according to claim 6, **characterized** in that said memory means is located in a removable memory unit (403).

8. A method for changing the service selection offered to a mobile station in a communications system that comprises base stations for providing mobile stations with communications links, **characterized** in that it comprises steps in which
- 5 - information is generated about the arrival of a mobile station in a localized service area (203), and
- the service selection offered to said mobile station on the initiative of the communications system is changed (205).
9. A method according to claim 8, **characterized** in that the information about the arrival of a mobile station in a localized service area is generated by receiving
- 10 from the mobile station a message (203) indicating that the mobile station has detected that it is in the localized service area.
10. A method according to claim 8, **characterized** in that the information about the arrival of a mobile station in a localized service area is generated by comparing mobile station identifiers with a list of identifiers in a register (304) listing mobile
- 15 stations to which the localized service area in question has been designated.
11. A method according to claim 10, **characterized** in that said comparison is performed in a certain register (304) and said changing of the service selection offered to a mobile station on the initiative of the communications system is performed in a second apparatus (305) in the communications system when the information about the result of the comparison has been sent from said register (304) to
- 20 said second apparatus (305) in the communications system.
12. A method according to claim 8, **characterized** in that in response to the information about the arrival of a mobile station in a localized service area a predetermined additional service is offered to the mobile station.
- 25 13. A method according to claim 12, **characterized** in that said additional service involves the sending of announcements to the mobile station.
14. A method according to claim 8, **characterized** in that in response to the information about the arrival of a mobile station in a localized service area the quantity of services offered to the mobile station on the initiative of the communications system is reduced.
- 30 15. A method according to claim 8, **characterized** in that it is comprised of steps where

- a message (203) indicating the arrival of a mobile station in a localized service area is communicated to a service server (108),
  - it is checked what services should be offered to the mobile station in that localized service area,
- 5    - a request (204) for the services to be offered is communicated to an application server (109) providing the services, and
- a service (205) produced by the application server is provided to the mobile station.
16. A method according to claim 15, **characterized** in that it is comprised of steps
- 10    where
- the request for the services to be offered is sent to at least two application servers providing services, and
  - a service produced by every application server, to which the request for the services to be offered was made, is provided to the mobile station.

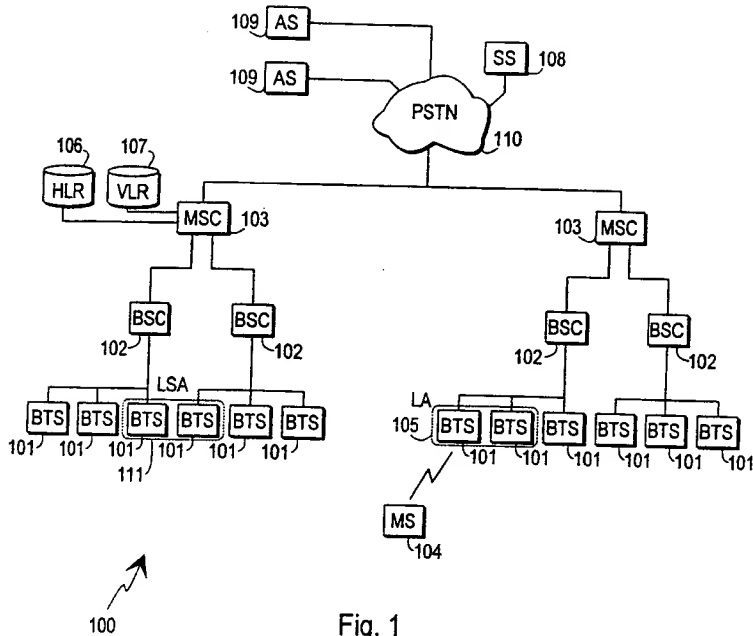


Fig. 1

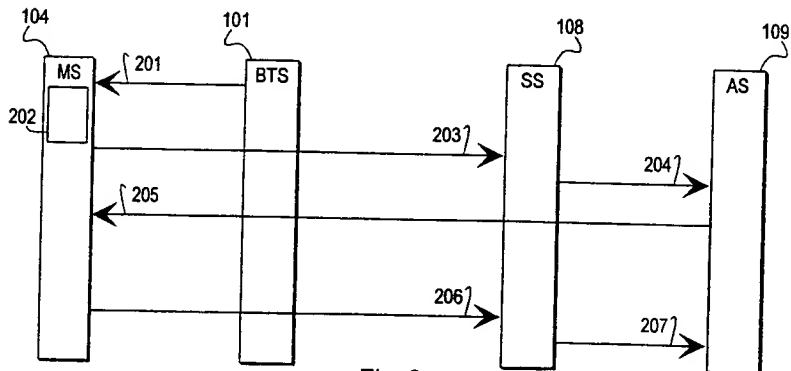


Fig. 2

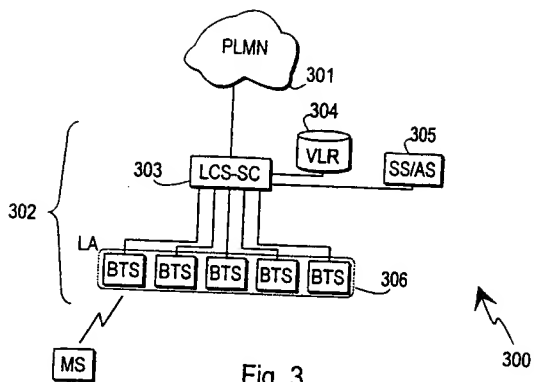


Fig. 3

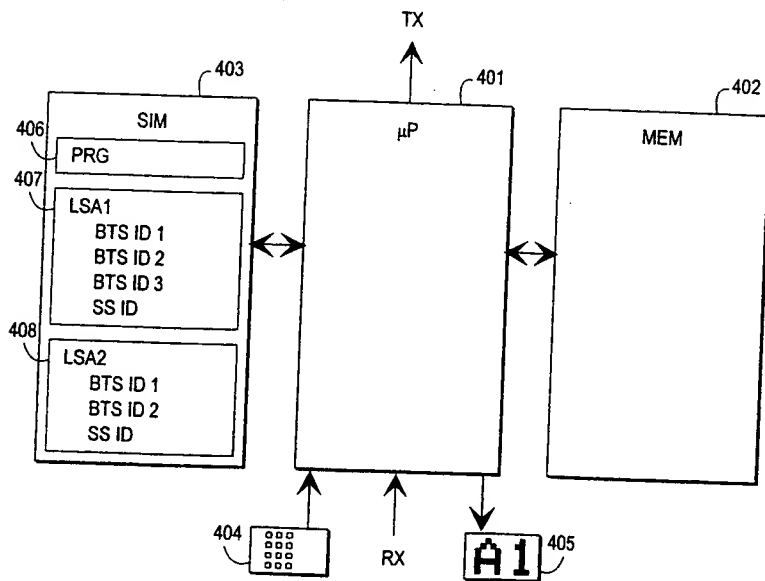


Fig. 4

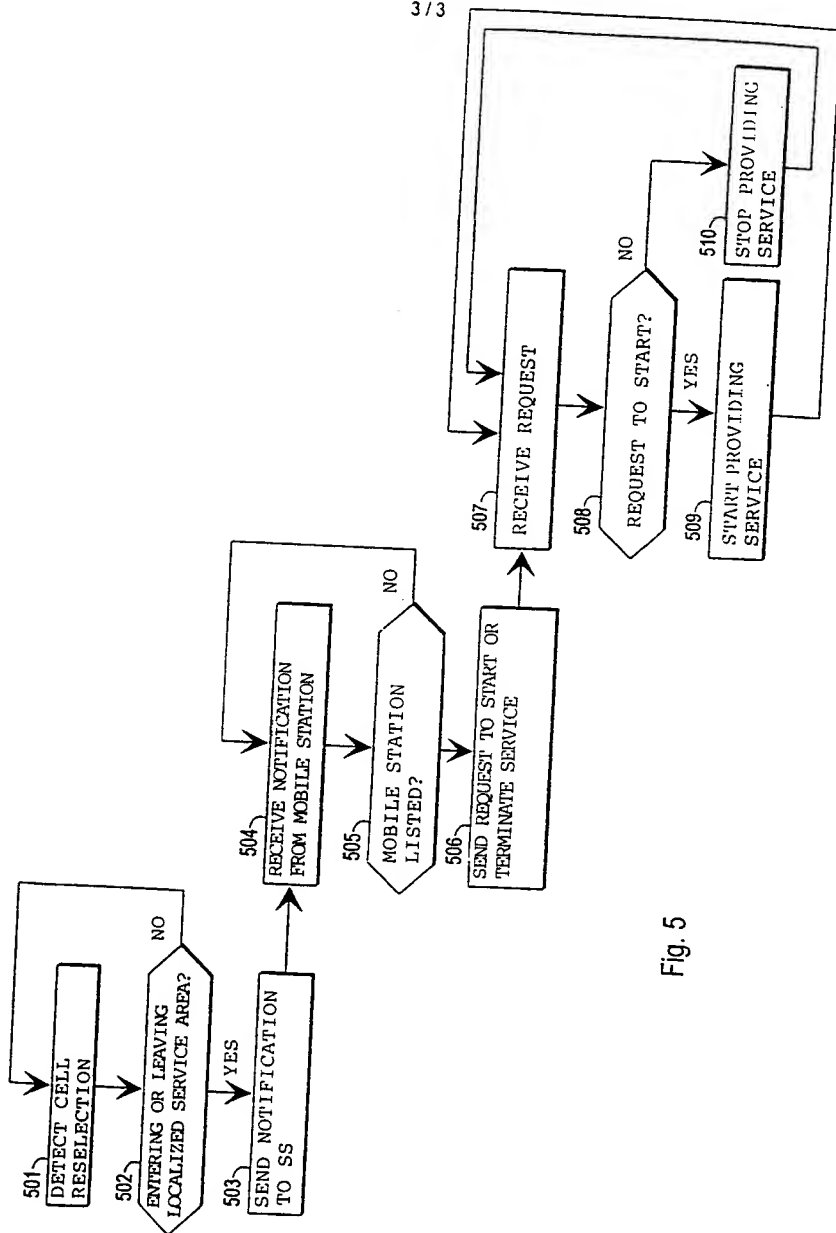


Fig. 5

## PATENT COOPERATION TREATY

## PCT

## INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

By Express Mail  
No. EL628565445US

Applicant's or agent's file reference <b>47555</b>	<b>FOR FURTHER ACTION</b> see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.	
International application No. <b>PCT/FI 99/00227</b>	International filing date (day/month/year) <b>23 March 1999</b>	(Earliest) Priority Date (day/month/year) <b>23 March 1998</b>
Applicant <b>Nokia Telecommunications OY et al</b>		

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 3 sheets.

☒ It is also accompanied by a copy of each prior art document cited in this report.

1. ☐ Certain claims were found unsearchable (See Box I).
2. ☐ Unity of invention is lacking (See Box II).
3. ☐ The international application contains disclosure of a nucleotide and/or amino acid sequence listing and the international search was carried out on the basis of the sequence listing
  - ☐ filed with the international application.
  - ☐ furnished by the applicant separately from the international application,
    - ☐ but not accompanied by a statement to the effect that it did not include matter going beyond the disclosure in the international application as filed.
  - ☐ transcribed by this Authority.
4. With regard to the title, ☒ the text is approved as submitted by the applicant.
  - ☐ the text has been established by this Authority to read as follows:
5. With regard to the abstract,
  - ☒ the text is approved as submitted by the applicant.
  - ☐ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.
6. The figure of the drawings to be published with the abstract is:
  - Figure No. 1 ☒ as suggested by the applicant.
  - ☐ because the applicant failed to suggest a figure.
  - ☐ because this figure better characterizes the invention.
  - ☐ None of the figures.

National application No.  
PCT/FI 99/00227

## A. CLASSIFICATION OF SUBJECT MATTER

IPC6: H04Q 7/38

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC6: H04Q

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	FR 2711033 A1 (COMPAGNIE FINANCIERE POUR LE RADIOTELEPHONE (COFIRA)(S.A.)), 14 April 1995 (14.04.95), page 1, line 11 - line 19, abstract	1,8,12
A	page 10, line 10 - page 11, line 28, figures 1,2 --	2-4,9,14,15
X	CA 2195487 A1 (AT&T WIRELESS SERVICES, INC.), 20 August 1997 (20.08.97), page 2, line 21 - line 28; page 6, line 17 - line 21, abstract --	1,4,8,12,13, 14

☒ Further documents are listed in the continuation of Box C.☒ See patent family annex.

## \* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"I" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&amp;" document member of the same patent family

Date of the actual completion of the international search

3 Sept. 1999

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07 -09- 1999

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2  
INTERNATIONAL SEARCH REPORT

International application No.  
PCT/FI 99/00227

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0783235 A2 (AT&T CORP.), 9 July 1997 (09.07.97), see the whole document	1-5,8,10-12, 14,15
Y		6,7,9
A		16
	--	
Y,E	EP 0915631 A2 (NOKIA MOBILE PHONES LTD.), 12 May 1999 (12.05.99), see the whole document	6-7,9
	--	
A	US 5603090 A (TUAN K. NGUYEN ET AL), 11 February 1997 (11.02.97), page 1, line 38 - line 53	6,7,9
	-- -----	

# INTERNATIONAL SEARCH REPORT

Information on patent family members

02/08/99

International application No.  
PCT/FI 99/00227

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
FR 2711033 A1	14/04/95	EP 0647076 A FR 2711023 A,B	05/04/95 14/04/95
CA 2195487 A1	20/08/97	NONE	
EP 0783235 A2	09/07/97	JP 9200836 A US 5740538 A	31/07/97 14/04/98
EP 0915631 A2	12/05/99	AU 8864998 A FI 973456 A WO 9911085 A	16/03/99 23/02/99 04/03/99
US 5603090 A	11/02/97	NONE	

430 Rec'd FORTO 22 SEP 2000  
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Authorized Officer: Teiweis, J  
Our ref: 47555/MB/MG

**REPLY TO WRITTEN OPINION**  
**INTERNATIONAL PATENT APPLICATION PCT/FI99/00227**  
**APPLICANT: NOKIA NETWORKS OY ET AL.**  
**Due Date: 24 May 2000**

On account of the Written Opinion issued on 24 February 2000 we submit the following:

The applicant admits that the general concept of providing the user of a cellular radio communications system with a location-dependent service profile is known from the cited reference publications. For example D1 discloses the definition of a so-called user zone, which consists of one or more cells and/or cell sectors. It is on the responsibility of a mobile telephone switching office (more commonly known as the MSC or Mobile services Switching Centre) to store a user zone profile and to modify a service profile for a cellular telephone when that cellular telephone is situated within the user zone. Lines 16-17 of page 10 underline the fact that also some other intelligent network nodes can be used to store the user profiles.

D2 describes a method for identifying the proximate location of a wireless terminal. As an application of such location identification, D2 mentions the possibility of offering position-related weather reports to the users of wireless terminals. This is another example of known applications of location-dependent service profiles. D3 discloses the use of a location server which specializes in finding out the approximate locations of mobile stations.

A common feature which links together the location-dependent service providing arrangements disclosed in D1, D2 and D3 is the prominent role of the network in finding out the location of the mobile terminal with respect to the service areas. D1 mentions in its prior art analysis (page 2, lines 1-10) a known arrangement where location-specific handling of incoming calls takes place in response to the network finding (i.e. reading from a network-based location register) that the subscriber is either at remote location "A" or "B". In a text passage between page 17, line 27 to page 19, line 24, D1 describes how the network reacts to the establishing of a communications link between the terminal and a certain MTSO by determining, whether the terminal is within a user zone. See especially page 18, lines 26-29, where the responsibility of

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determining the location of the terminal is given to a processor within the MTSO.

The location finding procedure proposed in D2 is based on the base stations indicating their base station specific location identifiers (see column 2, lines 4-6), which is another network-based solution. A similar arrangement is known from D3, where the mobile terminal makes a call connection request to the telephone number of a specific location server. The base station subsystem which is handling the request includes a base station identifier to the request so that the location server is able to extract the location of the terminal from the call connection request to the accuracy of a single cell (described on page 10, lines 23-30).

The most important embodiment of the present invention is based on the mobile station being given the responsibility for generating the location information and communicating it to the service server. This is a clear distinction to the known prior art principles where the network is the place where the actual location information is generated.

The Examiner has addressed the feature of performing the recognition of a localized service area in paragraph 2.5 of the Office Action, and considered it to be an implementation possibility and not to comprise inherent inventiveness. The applicant respectfully disagrees. If the network is responsible for the location identification, the applicant and his mobile terminal have little to do if for example some operator refuses to implement this feature in his base station subsystems and/or switching centres. On the other hand, if the location recognition is a feature of the mobile terminal itself, the whole procedure of offering localized services may be made completely independent of the network operators. The service server may be, for example, a computer at the premises of an operator-independent service provider, and the operator-maintained network hardware is only used as the carrier of information. When the principle of mobile station specific location recognition is followed, truly no changes are required to the cellular networks themselves. The terminal manufacturers may even utilize the location specific service arrangements for example as marketing tricks in launching their newest models which are better than older ones in that they are able to perform the location recognition and use the location specific services.

The appended set of amended claims is now constructed so that each independent claim literally requires the location information to be generated in the mobile station. References to those embodiments where the network constructed the location information e.g. by comparing the identifier of the mobile station to a list of previously stored identifiers have been removed from the claims. Two paragraphs have been added to the description, bridging pages 1 and 2, to meet the requirements of Rule 5.1(a)(ii) PCT. The description has been brought into conformity with the new claims, and the statement indicating the technical problem to be solved has been revised. No other changes have

*Berggren*

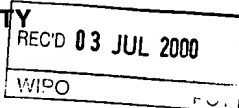
been made to the specification. The applicant respectfully requests a positive reconsideration of the merits of the application in its amended form.

**BERGGREN OY AB**

*Matti Brax*

Matti Brax  
Patent Agent

Encls      amended claims, description and abstract in triplicate



INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 47555 /MB	<b>FOR FURTHER ACTION</b>		See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
International application No. PCT/FI99/00227	International filing date (day/month/year) 23/03/1999	Priority date (day/month/year) 23/03/1998	
International Patent Classification (IPC) or national classification and IPC H04Q7/38			
Applicant NOKIA NETWORKS OY et al.			
<p>1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 7 sheets, including this cover sheet.</p> <p><input checked="" type="checkbox"/> This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).</p> <p>These annexes consist of a total of 15 sheets.</p>			
<p>3. This report contains indications relating to the following items:</p> <ul style="list-style-type: none"> <li>I <input checked="" type="checkbox"/> Basis of the report</li> <li>II <input type="checkbox"/> Priority</li> <li>III <input type="checkbox"/> Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</li> <li>IV <input type="checkbox"/> Lack of unity of invention</li> <li>V <input checked="" type="checkbox"/> Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</li> <li>VI <input checked="" type="checkbox"/> Certain documents cited</li> <li>VII <input type="checkbox"/> Certain defects in the international application</li> <li>VIII <input checked="" type="checkbox"/> Certain observations on the international application</li> </ul>			

Date of submission of the demand 14/10/1999	Date of completion of this report 30.06.2000
Name and mailing address of the international preliminary examining authority: European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d	Authorized officer  Teiwas, J



**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT**

International application No. PCT/FI99/00227

**I. Basis of the report**

1. This report has been drawn on the basis of *(substitute sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to the report since they do not contain amendments.)*:

**Description, pages:**

1-12 as received on 09/05/2000 with letter of 04/05/2000

**Claims, No.:**

1-12 as received on 09/05/2000 with letter of 04/05/2000

**Drawings, sheets:**

1/3-3/3 as originally filed

2. The amendments have resulted in the cancellation of:

- ☐ the description, pages:  
☐ the claims, Nos.:  
☐ the drawings, sheets:

3. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

4. Additional observations, if necessary:

**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT**

International application No. PCT/FI99/00227

**V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

**1. Statement**

Novelty (N)	Yes:	Claims	1-12
	No:	Claims	
Inventive step (IS)	Yes:	Claims	5-12
	No:	Claims	1-4
Industrial applicability (IA)	Yes:	Claims	1-14
	No:	Claims	

**2. Citations and explanations**

**see separate sheet**

**VI. Certain documents cited**

**1. Certain published documents (Rule 70.10)**

and / or

**2. Non-written disclosures (Rule 70.9)**

**see separate sheet**

**VIII. Certain observations on the international application**

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

**see separate sheet**



**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT - SEPARATE SHEET**

---

International application No. PCT/FI99/00227

**Re Item V**

**Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

- 1 Reference is made to the following documents (Di):

D1: CA 2195487 AT&T WIRELESS SERVICES, INC., 20 August 1997

D2: EP 0783236 AT&T CORP., 9 July 1997

D3: FR 2711033 COMPAGNIE FINANCIERE POUR LE RADIOTELEPHONE  
(COFIRA) (S.A.), 14 April 1995

- 2 The present application does not meet the requirements of Articles 33(1) and (3) PCT, because the subject-matter of claim 1 is not inventive.
- 2.1 The present formulation of independent system claim 1 is such that its subject matter can be read onto prior art document D1, which relates to the customization of cellular telephone service features for specific subscribers.

In particular, document D1 discloses a communications system with at least one localized service area (see page 2, lines 12-17).

D1 further discloses a service server which is arranged to maintain information concerning the location of mobile stations in localized service areas (page 10, line 12-17; fig.1, obj.113; fig.2) and to generate requests for changing the service selection offered to mobile stations (page 19, line 17-20) in response to receiving, from the mobile stations, mobile station generated messages (page 28, claim 6(c)).

D1 further discloses means for changing the service selection offered to a mobile station on the initiative of the communications system in response to an indication of the arrival of the mobile station in said localized service area (see page 2, lines 24-25).

Hence, the subject matter of claim 1 differs from D1 in that the message from the mobile station describes the location of the mobile station. However, only getting the location information from the mobile station does not involve a special technical effect and is therefore not inventive.

**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT - SEPARATE SHEET**

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International application No. PCT/FI99/00227

- 2.2 The present broad formulation of independent system claim 1 is such that objections related to inventive step could have additionally been based on prior art document D2, which relates to a *wireless communications system for identifying the location of a wireless terminal to provide location based services* (see page 1, lines 1-13), or D3, which relates to a *wireless communication system providing location based services* (see page 1, lines 11-14).
- 2.3 The additional features of dependent claims 2-4 seem either to be disclosed by some prior art (claim 2 see D2: fig.1, 104, 108; claim 3 see D3: fig.4, obj.11; ) or seem to be implementation measures not involving any special technical effect or are well known in the art of cellular communications systems. Hence, the additional features of said claims do not add anything inventive to claim 1.
- 2.4 The structural features of independent apparatus claim 5 which is related to a cellular mobile station correspond to already discussed structural features of independent system claim 1 except for one. Claim 5 also differs from D1 in that feature, namely in that the apparatus is adapted to store information required for recognizing a localized service area taken in combination with sending a notification of the recognition of a localized service area. This is interpreted in such a way that the recognition of a localized service area is performed by the mobile station instead of the MSC (see Item VIII 1)).  
The apparatus of claim 5 solves the problem to make the offering of localized services more independent of the network and therewith independent of the network operators.  
The prior art documents D1, D2 and D3 all state that the location recognition is performed by the network.  
Hence, claim 5 includes inventive subject matter and therefore fulfils the requirements of Articles 33(1), (2) and (3) PCT.
- 2.5 Due to the fact that dependent claim 6 is based on independent claim 5 and referring to further embodiments of the subject matter of independent claim 5, claim 6 also meets the requirements of Article 33(1), (2) and (3) PCT.
- 2.6 The method steps of independent claim 7 correspond to the already discussed

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structural features of independent claims 1 and 5. Claim 7 differs from D1 in that the recognition of a localized service area is performed by the mobile station instead of the MSC (see Item VIII 2)).

The method claim 7 solves the problem to make the offering of localized services in a communication network more independent of the network and therewith independent of the network operators.

The prior art documents D1, D2 and D3 all state that the location recognition is performed by the network.

Hence, claim 7 includes inventive subject matter and therefore fulfils the requirements of Articles 33(1), (2) and (3) PCT.

- 2.7 Due to the fact that dependent claim 8-12 are based on independent method claim 7 and referring to further embodiments of the subject matter of independent claim 7, claims 8-12 also meet the requirements of Article 33(1), (2) and (3) PCT.

**Re Item VI**

**Certain documents cited**

Certain published documents (Rule 70.10 PCT)

Application No Patent No	Publication date (day/month/year)	Filing date (day/month/year)	Priority date (valid claim) (day/month/year)
EP 0 915631	12.5.99	21.8.98	22.8.97
FI 973456	23.2.99		

The priority document of the application was not available at the time of the preliminary examination. It is therefore assumed that the priority of the application is valid in consequence of which the priority document FI 973456 of document EP 98 115 761.3 is not considered as prior art. Said assumption will be invalid if it turns out that the priority of the application is not valid and then the document could become relevant in a later regional or national examination procedure.

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**Re Item VIII**

**Certain observations on the international application**

- 1 The ability of the mobile station to detect that it is in the localized service area (see claim 7 or page 3, line 20,21) and to send this information to an apparatus responsible for providing localized services in the network (see page 3, line 27-29) is considered as being essential for the invention. Otherwise the basic idea of the invention is not unambiguously clear.  
Hence, these technical features e.g. means for achieving this should have been mentioned in independent claims 1 and 5 to fulfil Rule 6.3 a) PCT and Article 6 PCT.
  
- 2 The wording of claim 7 is not unambiguously clear. Moreover, the amendments should have clarified the exact difference between the following two features (Article 6 PCT):
  - from the mobile station there is received a message indicating that the mobile station has detected that it is in the localized service area
  - and
  - information is generated about the arrival of a mobile station in a localized service area.It is further not clear from the wording of claim 7, which instance is receiving the "detection"-message from the mobile station. And it is further not clear, on which basis the service selection offered to the mobile station is changed, because there is no method step existing in the method claimed, said method step including some kind of evaluation of the received "detection"-message. There must be some method step filling the gap in the logical chain between "receiving" and "changing".  
Hence, these features are essential for the invention and should have been mentioned in independent method claim 7 to fulfil Rule 6.3 a) PCT and Article 6 PCT.

## Method and system for using location dependent services in a cellular radio system

5 The invention relates in general to the provision and delivery of services offered by a network to a mobile station. In particular the invention relates to the utilization of information concerning the location of a mobile station for the purpose of providing services.

10 A modern communications network provides mobile station owners with individual programmable services. A digital telephone network is one such network. Services known to be provided by it include programmable call transfer and voice mail system, which usually are implemented at a switching center. Networks are also known in which certain services are provided by an outside service provider who pays to the communications network operator for the use of their network, and the services provided by said service provider are located physically elsewhere than at switching centers. This patent application uses a digital cellular radio system as an example of  
15 a communications network.

In known networks the provision of services has not depended on the part of the network the user is located in when he places a call to an apparatus or equipment providing a service. According to a recent proposal, however, different locations can be specified for a mobile station in a network. Then, as a mobile station is registered  
20 in a cell, the service that it receives may be different according to its location. However, it would be advantageous in various situations if different services could be offered to the user according to his physical location on the initiative of the network, without the mobile station actually establishing a connection to the network. Such services are called network initiated services, and they include so-called  
25 push services in which an apparatus connected to the network sends data to mobile stations without the mobile stations requesting said information. An example of a locally arranged push service which cannot be implemented using prior-art solutions is to send the day's menu at a cafeteria of a company to the mobile stations of all those employees who are within the premises of the company as lunchtime is  
30 approaching.

The reference publication CA 2,195,487 discloses the definition of a so-called user zone, which consists of one or more cells and/or cell sectors. It is on the responsibility of a mobile telephone switching office (more commonly known as the MSC or Mobile services Switching Centre) to store a user zone profile and to

modify a service profile for a cellular telephone when that cellular telephone is situated within the user zone.

5 The reference publication EP 0 783 235 describes a method for identifying the proximate location of a wireless terminal. As an application of such location identification, the publication mentions the possibility of offering position-related weather reports to the users of wireless terminals. This is another example of known applications of location-dependent service profiles. The reference publication FR 2 711 033 discloses the use of a location server which specializes in finding out the approximate locations of mobile stations.

10 An object of the present invention is to provide a method and system for making services provided by a network available to the user in various ways depending on the location of the user, without placing large requirements to the network.

15 The objects of the invention are achieved by storing in the memory of the mobile station the information on the basis of which it recognizes that it is situated in a given localized service area and by programming the mobile station such that in response to such recognition it sends an appropriate message to an apparatus that provides services.

20 The invention pertains to a communications system that comprises base stations for providing mobile stations with communications links and at least one localized service area. It is characterized in that it comprises a service server which is arranged to maintain information concerning the location of mobile stations in localized service areas and to generate requests for changing the service selection offered to mobile stations in response to receiving, from the mobile stations, mobile station generated messages describing the location of the mobile stations in relation to localized service areas, and means for changing the service selection offered to a mobile station on the initiative of the communications system in response to an indication of the arrival of the mobile station in said localized service area.

25 The invention also pertains to a cellular mobile station that comprises a control block and storage means. It is characterized in that its storage means are adapted so as to store the information required to recognize a given localized service area whereby the mobile station is arranged so as to send – in response to the recognition of a localized service area – a notification of its arrival in the localized service area, said notification being intended to function as an impulse for changing the service selection offered to the mobile station.

The invention further pertains to a method for changing the service selection offered to a mobile station in a communications system that comprises base stations for providing mobile stations with communications links. The method is characterized in that it comprises steps in which

- 5 - from the mobile station there is received a message indicating that the mobile station has detected that it is in the localized service area
- information is generated about the arrival of a mobile station in a localized service area, and
- 10 - the service selection offered to said mobile station on the initiative of the communications system is changed.

In accordance with the invention, localized service areas (LSA) are defined for mobile stations, which areas may be purely geographical or may have some other criteria. In addition to or instead of the geographical definition a localized service area may be defined e.g. in chronological terms. "Geographical definition" means  
15 generally definitions associated with a place or area: a localized service area may comprise a base station cell, several cells, a location area (LA), a public land mobile network (PLMN), an area defined by coordinates, certain cell identifiers, or an area in which base stations send to mobile stations some other identifier. Combinations of these alternatives may be used, too.

20 Information about how a mobile station can recognize that it is in a given localized service area is stored in the memory of the mobile station. Since services are usually in a way or another associated with the subscription contract in which the user is given certain user-specific rights to use the communications network, it is preferable to store the information relating to the recognition of a localized service area in the  
25 user's SIM (subscriber identity module) card or a corresponding memory means intended specifically for the identification of the user independent of the apparatus used. In response to a positive identification the user's mobile station sends a message addressed to an apparatus responsible for providing localized services in the network. With this message the mobile station tells that the user is in a certain localized service area. On the basis of the message the network can offer to the user  
30 just those services that are needed in that localized service area. When the mobile station moves elsewhere, it sends a similar message telling that it is leaving the localized service area. The network may also automatically deduce that the mobile station has left the area as a certain condition is met. Such conditions include e.g.  
35 that

- the mobile station does not respond to the next paging message or another message sent in the localized service area in question,
- the mobile station does not acknowledge a data packet addressed to it,
- the mobile station does not in a certain period of time renew its message of arrival in the localized service area, or
- the mobile station does not in a certain period of time send another message that must be sent periodically, such as the periodic location update (PLU) message, for example.

The apparatus, to which the mobile station addresses its location message, may be maintained by the network operator or a service provider. The message may be an SMS (Short Message Service) message, an unstructured supplementary service data (USSD) message, a DTMF-coded (Dual Tone Multi-Frequency) message sent in conjunction with an ordinary call, or a data call. In response to the message the apparatus, to which the mobile station addresses its location message, may e.g. send information about the area in question to the mobile station or start the regular or periodic sending of such information, which goes on until the mobile station leaves the localized service area. Furthermore, the apparatus providing the services may activate or inactivate another localized service, send information about the location of the mobile station to other apparatus which need that information in their operation, or carry out some other function. One option is that mobile stations are assigned certain localized service profiles which may comprise various factors from call pricing to data rates of data calls or to priorities of call establishment and management. The application of the service profile is in that case based on the location of the mobile station in a given localized service area.

The invention is below described in more detail with reference to the preferred embodiments presented by way of example and to the accompanying drawing in which

- Fig. 1 shows a communications system according to the invention,
- Fig. 2 illustrates the exchange of messages in the communications system according to Fig. 1,
- Fig. 3 shows a second communications system according to the invention,
- Fig. 4 shows a mobile station according to the invention, and
- Fig. 5 shows an embodiment of the method according to the invention.

Fig. 1 shows a cellular radio system 100 which in a known manner comprises base transceiver stations (BTS) 101, base station controllers (BSC) 102 and mobile switching centers (MSC) 103. A mobile station (MS) 104 is connected via radio to



at least one base transceiver station 101 so that the system considers the mobile station to be located in that location area (LA) 105 to which the coverage area, or cell, of that particular base transceiver station belongs. A location area may comprise one or more cells. For the purpose of maintaining location data of mobile stations and routing calls the system includes home location registers (HLR) 106 and visitor location registers (VLR) 107 which usually are located at mobile switching centers. In the system according to Fig. 1 a service server (SS) 108 and application servers (AS) 109 are also connected to the cellular radio network through wire links. Connections from the cellular radio network to servers 108 and 109 may be either direct, in which case the servers are in a way part of the cellular radio system, or routed via the public switched telephone network (PSTN) 110. Direct connections will be used mainly when servers 108 and 109 are maintained by the same operator who is responsible for the operation of the cellular radio system.

A prerequisite for the operation according to the invention is that somehow a piece of information is generated indicating that a mobile station is located in a certain designated localized service area 111. As was mentioned above, a localized service area may be the same as a given location area but nothing prevents from defining localized service areas completely differently; in Fig. 1 the localized service area 111 includes base transceiver stations under two different base station controllers. According to a first embodiment of the invention, however, a service area always comprises a certain cell or certain cells. If the coverage area of a base transceiver station can by means of directional antennas be divided into cells or blocks smaller than the central cell around the base transceiver station such that the system can make a logical distinction between those cells or blocks, then these smaller areas can also be utilized in defining the localized service area. The information about the location of a mobile station in a service area can then be generated either at the mobile station, which is regarded as the more preferable embodiment, or in fixed parts of the system. A limitation of the latter option is that since known cellular radio systems maintain mobile station location data only with the accuracy of a location area, defining a localized service area smaller than one location area would call for changes in the operation of the system.

Let us then assume that the information about the location of a mobile station in a localized service area is generated at the mobile station itself. To that end there exist several known methods which usually are based on the fact that every base transceiver station in known cellular radio systems sends general control information that can be received in the whole cell area and which e.g. comprises the unequivocal

identifier of the base transceiver station or some other information characteristic of the base transceiver station. A method for detecting base station specific identifiers has been stored in advance in the mobile station. In the simplest case the memory of the mobile station stores a list of the identifiers of the base transceiver stations the  
5 cells of which make a particular localized service area. By comparing the received identifier with the list in the memory the mobile station finds out whether it is located in a certain localized service area. According to an alternative embodiment only a certain mask is stored in the memory of the mobile station so that the mobile  
10 station uses the mask to select certain characters from the base station specific identifier to be examined. If the characters examined form or follow a certain pattern the base station cell belongs to a localized service area. An advantage of this embodiment is that if the communications capacity of the localized service area is increased by establishing a new base station in the area, there is no need to separately send the  
15 identifier of the new base station to each mobile station to which the localized service area has been assigned; it suffices that the masked characters in the new base station identifier are the same as or corresponding to those of the other base stations in that localized service area.

According to a second embodiment of the invention a localized service area is not associated with base station cells but has certain geographic coordinates. In this  
20 embodiment a mobile station may detect that it is in a given service area e.g. in such a manner that each base station sends together with the general control information information about the location of the base station in a geographic coordinate system. Having received the coordinates the mobile station may examine whether the point indicated by the coordinates is located within a localized service area assigned to the  
25 mobile station. In a more versatile method the mobile station may receive coordinates from all the base stations from which it can receive general control information, and assume that its own location is the average of the coordinates received. By comparing the location it has computed with the stored geographic definition of the localized service area the mobile station detects whether or not it is in the localized  
30 service area. Future mobile stations may include a GPS (Global Positioning System) receiver or some other means completely independent of base stations to determine the location of the mobile station in a geographic coordinate system. This makes it possible to define a localized service area completely independent of the cellular radio system cells.

35 According to a third embodiment of the invention, temporal dimension is also included in the definition of a localized service area. If a cellular radio system com-

prises cells A, B, C, D and E, it can be defined that a given localized service area comprises at all times cells A and B, but cell C only between 12 and 3 o'clock in the afternoon, and cells D and E on Wednesday, Friday and Saturday from 6 p.m. till 3 a.m. in the next morning. Naturally the temporal dimension may also be combined with the cell-independent geographic definition described above.

Fig. 2 assumes that the information about the location of a mobile station in a given service area is generated at the mobile station on the basis of a base station specific identifier received by the mobile station from the base station. The figure illustrates in a simplified manner the exchange of messages relating to the operation according to a preferred embodiment of the invention between a mobile station 104, base transceiver station 101, service server 108 and application server 109. The messages are depicted by arrows and their chronological order is from top down. Message 201 is a known general control information message sent by the base station to the mobile station, comprising a base station specific identifier. General information messages include e.g. information sent by base stations on the broadcast control channel (BCCH) in the GSM system. Block 202 refers to the comparison at the mobile station with an identifier list, or some other activity on the basis of which the mobile station detects that it has arrived in a certain localized service area. In response to that observation the mobile station sends to the service server a message 203 in which it includes an identifier characteristic of the mobile station, say an IMSI (International Mobile Subscriber Identifier) code or MS-ISDN (Mobile Subscriber Integrated Services Digital Network) number stored in the SIM card of the mobile station.

The invention does not limit the form of message 203. One advantageous option is to use an SMS message such that the mobile station reads from the memory the phone number of the service server and sends the SMS message to that number. A second option is to use a free-form data message specified in many digital cellular radio systems; in the GSM it is called an USSD message. The mobile station may also by itself establish a call connection to the service server and send the message 203 DTMF-coded or as a data call.

The role of the service server in the embodiment according to Fig. 2 is to maintain information about which mobile stations are in which localized service areas and which services should be offered to them accordingly. The actual service is provided by the application server. Having received message 203 the service server reads from its memory which services should be offered to the mobile station in that localized service area and sends a service request 204 to the appropriate application

server. The information about what services are provided by which application servers is also stored in the memory of the service server so that it can send the service request 204 to the correct application server. The invention does not limit the form of the service request 204. From the prior art it is known several methods  
 5 for realizing communication between two servers connected to a communications network.

In response to a service request 204 the application server provides the mobile station with a service, indicated in Fig. 2 simply by an arrow 205. The service is not necessarily a simple message and its commencement does not necessarily involve  
 10 only information sent to the mobile station. A mobile station may have a whole service profile defined for it in a localized service area, including e.g.

- call pricing or prioritization,
- limitations concerning the modulation method, data rate and/or connection quality in the communication between the base station and mobile station,
- 15 - routing of incoming email messages to a mobile station instead of the user's desktop workstation, or
- activation or inactivation of automatic call transfer and/or voice mail service.

The mobile station may also have the right or obligation in a given localized service area to receive messages periodically e.g. with regard to the weather, traffic, stock exchange rates and so on. Thus the application server may at the stage represented  
 20 by arrow 205 establish connections in a versatile manner with various apparatus in the cellular radio system or in communication with the cellular radio system. On the other hand, the service server may have instructions stored in its memory to request services from more than one application server, in which case there would be  
 25 several messages 204 sent to a plurality of application servers.

Fig. 2 further assumes that the mobile station leaves the localized service area in accordance with controlled cell reselection in which case it sends to the service server a notification 206 about its departure from the service area. In response to the departure message the service server sends to the application server a request 207 to  
 30 terminate the service. The mobile station can send message 206 via the old base station always when leaving a cell belonging to the localized service area regardless of whether the new cell belongs to the same localized service area. In an alternative embodiment the mobile station checks always after a cell reselection whether it is still in the same localized service area, and if not, it sends via the new base station a  
 35 notification about its departure to the service server. According to a second alternative embodiment mobile stations do not send departure messages at all but the de-

parture of a mobile station from a given localized service area is detected by fixed parts of the system e.g. when a mobile station will not respond to a paging message or another message sent to it in that localized service area, or will not send the specified periodic location update message or some other mandatory periodic notification, or when the service server sends regularly or periodically to all mobile stations in a localized service area a short data message which must be acknowledged by the mobile stations; a failure to acknowledge the message indicates that the mobile station in question is no more in the localized service area.

Above it was disclosed that in a given localized service area a mobile station receives a certain service. However, service areas may be defined which are characterized in that a mobile station will not be offered a service that it would receive elsewhere. A mobile station may be assigned several service areas with different operating instructions for the different areas. The service server which the mobile station informs about its arrival in a localized service area may be always the same or different in some localized service areas. Alone the fact that whether or not a mobile station indicates its arrival in a localized service area and if so, how quickly it does it, may depend on the service area. The user may be given a choice about whether or not to give notification about his arrival in a localized service area. The mobile station may even inform the user that he has now arrived in a localized service area and ask for permission to send the notification of arrival. In connection with the request for permission the user may be given a short description of the consequences of sending the notification of arrival. On the other hand, certain localized service areas may be defined by the network operator such that the notification of arrival is compulsory, whereby a mobile station has to send a notification of arrival every time that it arrives in such a localized service area regardless of what the user instructs the mobile station to do.

Above it was disclosed that the service server and application server are separate apparatus. However, these functions can be integrated in one device, whereby the communication between the servers as described above is reduced to communication internal to a server. One or both of them may also be implemented in connection with a known apparatus that already belongs to the cellular radio system. Servers can advantageously be integrated in mobile switching centers or base station controllers.

Fig. 3 shows a communications system 300 according to the invention, in which a localized cellular service (LCS) 302 operates under a public land mobile network (PLMN) 301 in an area with a high traffic density; the mobile switching center

maintaining the service is called an LCS switching center (LCS-SC) 303. The LCS-SC operates just like a prior-art mobile switching center. It provides for the internal communication of the LCS and establishes, maintains and terminates connections between terminal equipment in the LCS and elsewhere. In connection with the LCS-SC there is a visitor location register 304 and a combined service and application server 305, which is called simply a server. In this embodiment of the invention the localized service area 306 covers all base stations operating under the LCS-SC (for simplicity, the base station controllers are not shown). Unlike above, the observation that a given mobile station has arrived in the localized service area is made in the fixed parts of the network, more specifically in the visitor location register 304. Let the cellular subsystem shown in Fig. 3 operate at an airport. Airline companies can provide the visitor location register 304 with the mobile phone numbers or other identifiers of their customers to whom certain benefits have been granted on the basis of their being frequent flyers, for example. As the visitor location register 304 detects that a mobile station associated with such an identifier has arrived in the area of the cellular subsystem, it sends appropriate information to the server 305. Instead of or in addition to the visitor location register other fixed network apparatus may take part in the sending of the message. In response to this information the server 305 starts sending to the mobile station announcements which are intended only to privileged customers of the airline companies. The announcements are advantageously delivered as SMS messages.

In known digital telephone systems the sending of SMS messages is carried out via SMS service centers and not directly from an apparatus to another. However, for simplicity the SMS service centers are not included in the description above but their use is considered to be known to a person skilled in the art. Other messages described above may also be sent between apparatus via various known intermediary devices.

Fig. 4 shows simplified a control block and some memory parts of a mobile station according to the invention. The control block 401 is preferably a microprocessor which is located in the mobile station in a known manner such that data received by the mobile station, except for data intended to be presented directly to the user, is conducted from the receiver chain RX to the control block and, correspondingly, outgoing data produced by the control block is conducted to the transmitter chain TX of the mobile station together with the data coming directly from the user (say, digitized speech). In the mobile station according to Fig. 4 the control block has access to a fixed memory 402 and a removable memory unit 403, which is e.g. a

smart card. The control block 401 also receives input from a keypad 404 and it outputs information on a display 405. A program executed by the control block 401 is stored in the fixed memory 402. Part of that program is an instruction to look for program extensions in the removable memory unit 403. For the operation according to the invention the removable memory unit includes a program 406 by means of which the mobile station is able to utilize localized service areas, as well as information 407, 408 about at least one localized service area (LSA1, LSA2). Fig. 4 assumes that the recognition of a localized service area is based on the mobile station comparing received base transceiver station identifiers (BTS ID) with a list of localized service areas stored in the memory. For each localized service area the removable memory unit 403 also includes a service server identifier (SS ID).

Fig. 5 illustrates the principle of a method according to a preferred embodiment of the invention in a mobile station, service server and application server. In accordance with block 501 the mobile station detects a cell reselection. It examines, block 502, whether any changes are occurring with respect to localized service areas, i.e. whether it is arriving in a localized service area (if until now it wasn't in one) or if it is leaving a localized service area (if until now it was in one). In accordance with block 503 the change triggers the sending of a message to a service server the operation of which starts from the reception of the message, block 504. According to block 505 the service server examines whether the mobile station in question is on the list of those to be served. If the mobile station is arriving in a localized service area, it is in block 505 recognized as a mobile station which is to be served. If, on the other hand, the mobile station is leaving a localized service area, it is recognized in block 505 as a mobile station the services to which have to be terminated. A corresponding message is sent according to block 506 to an application server which receives the message in block 507 and determines in block 508 whether the message calls for the starting or termination of a service. The service is then either started 509 or terminated 510 for the mobile station, whichever the case may be.

The embodiments of the invention described above are naturally examples only and do not limit the invention. Communications systems, to which the invention can be advantageously applied, include e.g. second-generation digital mobile phone systems such as the GSM and its extensions, PDC (Personal Digital Cellular), D-AMPS (Digital Advanced Mobile Phone System) and PCS (Personal Communications Services) and future third-generation digital cellular radio systems such as the

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12

UMTS (Universal Mobile Telecommunications System) and IMT-2000 (International Mobile Telecommunications at 2000 MHz).



## Claims

1. A communications system (100, 300) comprising

- base stations (101) for providing mobile stations (104) with communications links and

5 - at least one localized service area (111);

**characterized** in that it comprises

10 - a service server (108) which is arranged to maintain information concerning the location of mobile stations in localized service areas and to generate requests for changing the service selection offered to mobile stations in response to receiving, from the mobile stations, mobile station generated messages (203) describing the location of the mobile stations in relation to localized service areas, and

- means (108, 109) for changing the service selection offered to a mobile station on the initiative of the communications system in response to an indication of the arrival of the mobile station in said localized service area.

15 2. A communications system according to claim 1, **characterized** in that it comprises an application server (109) to provide mobile stations with different services in response to a request generated by the service server for changing the service selection.

20 3. A communications system according to claim 2, **characterized** in that said service server is the same as said application server.

4. A communications system according to claim 1, **characterized** in that it is adapted so as to change a localized service selection offered to a mobile station in response to a notification (203) sent by the mobile station on its arrival in a localized service area.

25 5. A cellular mobile station comprising a control block (401) and memory means (402, 403), **characterized** in that said memory means are adapted so as to store the information (407, 408) required for recognizing a localized service area, whereby the mobile station is adapted so as to send a notification (203) of its arrival in the localized service area in response to the recognition of the localized service area, said notification being intended as an impulse for changing the service selection  
30 offered to the mobile station.

6. A mobile station according to claim 5, **characterized** in that said memory means is located in a removable memory unit (403).
7. A method for changing the service selection offered to a mobile station in a communications system that comprises base stations for providing mobile stations with communications links, **characterized** in that it comprises steps in which
- from the mobile station there is received a message (203) indicating that the mobile station has detected that it is in the localized service area
  - information is generated about the arrival of a mobile station in a localized service area (203), and
  - the service selection offered to said mobile station on the initiative of the communications system is changed (205).
8. A method according to claim 7, **characterized** in that in response to the information about the arrival of a mobile station in a localized service area a predetermined additional service is offered to the mobile station.
9. A method according to claim 8, **characterized** in that said additional service involves the sending of announcements to the mobile station.
10. A method according to claim 7, **characterized** in that in response to the information about the arrival of a mobile station in a localized service area the quantity of services offered to the mobile station on the initiative of the communications system is reduced.
11. A method according to claim 7, **characterized** in that it comprises steps where
- a message (203) indicating the arrival of a mobile station in a localized service area is communicated to a service server (108),
  - it is checked what services should be offered to the mobile station in that localized service area,
  - a request (204) for the services to be offered is communicated to an application server (109) providing the services, and
  - a service (205) produced by the application server is provided to the mobile station.
12. A method according to claim 11, **characterized** in that it comprises steps where
- the request for the services to be offered is sent to at least two application servers providing services, and

- a service produced by every application server, to which the request for the services to be offered was made, is provided to the mobile station.

# PATENT COOPERATION TREATY

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from the above date of mailing

International application No.

PCT/FI99/00227

International filing date (day/month/year)

23/03/1999

Priority date (day/month/year)

23/03/1998

International Patent Classification (IPC) or both national classification and IPC

H04Q7/38

Applicant

NOKIA NETWORKS OY et al.

1. This written opinion is the **first** drawn up by this International Preliminary Examining Authority.

2. This opinion contains indications relating to the following items:

- I ☒ Basis of the opinion
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☒ Certain document cited
- VII ☒ Certain defects in the international application
- VIII ☐ Certain observations on the international application

3. The applicant is hereby **invited to reply** to this opinion.

- When?** See the time limit indicated above. The applicant may, before the expiration of that time limit, request this Authority to grant an extension, see Rule 66.2(d).
- How?** By submitting a written reply, accompanied, where appropriate, by amendments, according to Rule 66.3. For the form and the language of the amendments, see Rules 66.8 and 66.9.
- Also:** For an additional opportunity to submit amendments, see Rule 66.4.  
For the examiner's obligation to consider amendments and/or arguments, see Rule 66.4 bis.  
For an informal communication with the examiner, see Rule 66.6.

If no reply is filed, the international preliminary examination report will be established on the basis of this opinion.

4. The final date by which the international preliminary examination report must be established according to Rule 69.2 is: 23/07/2000.

Name and mailing address of the international preliminary examining authority:



European Patent Office  
D-80298 Munich  
Tel. +49 89 2399 - 0 Tx: 523656 epru d  
Fax: +49 89 2399 - 4465

Authorized officer / Examiner

Teiwes, J

Formalities officer (incl. extension of time limits)

Finnie, A  
Telephone No +49 89 2399 8251



## WRITTEN OPINION

International application No. PCT/FI99/00227

### I. Basis of the opinion

1. This opinion has been drawn on the basis of *(substitute sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this opinion as "originally filed")*.

#### Description, pages:

1-11 as originally filed

#### Claims, No.:

1-16 as originally filed

#### Drawings, sheets:

1/3-3/3 as originally filed

2. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:
- ☐ the drawings, sheets:

3. This opinion has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

4. Additional observations, if necessary:

### V. Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

#### 1. Statement

Novelty (N)	Claims	1-3,8,15
Inventive step (IS)	Claims	1-16
Industrial applicability (IA)	Claims	

#### 2. Citations and explanations

see separate sheet

**VI. Certain documents cited**

1. Certain published documents (Rule 70.10)

and / or

2. Non-written disclosures (Rule 70.9)

**see separate sheet**

**VII. Certain defects in the international application**

The following defects in the form or contents of the international application have been noted:

**see separate sheet**

Re Item V

**Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

- 1 Reference is made to the following documents (Di):

D1: CA 2195487 AT&T WIRELESS SERVICES, INC., 20 August 1997

D2: EP 0783236 AT&T CORP., 9 July 1997

D3: FR 2711033 COMPAGNIE FINANCIERE POUR LE RADIOTELEPHONE  
(COFIRA) (S.A.), 14 April 1995

- 2 The present application does not meet the requirements of Articles 33(1) and (2) PCT, because the subject-matter of claim 1 is not novel.
- 2.1 The present formulation of independent system claim 1 is such that its subject matter can be read onto prior art document D1, which relates to the customization of cellular telephone service features for specific subscribers.

In particular, document D1 discloses a communications system with at least one localized service area (see page 2, lines 12-17). D1 further discloses means for changing the service selection offered to a mobile station on the initiative of the communications system in response to an indication of the arrival of the mobile station in said localized service area (see page 2, lines 24-25).

Consequently, the features of independent claim 1 are already known from D1.

- 2.2 The present broad formulation of independent system claim 1 is such that it seems that its subject matter can additionally be read onto prior art document D2, which relates to a *wireless communications system for identifying the location of a wireless terminal to provide location based services* (see page 1, lines 1-13), or D3, which relates to a *wireless communication system providing location based services* (see page 1, lines 11-14).
- 2.3 It should be noted that even if the Applicant were to interpret claim 1 in such a manner as to enable him to allege that its subject matter were novel, based on minor differences between the features of this claim and those disclosed in D1, D2

or D3, the subject matter could still not involve an inventive step (Articles 33(1) and (3) PCT) because D1, D2 and D3 discloses the same object and the same type of solution with respect to the disclosure of claim 1.

- 2.4 The additional features of dependent claims 2-5 seem either to be disclosed by some prior art (claim 2 see D2: fig. 1, 104, 108; claim 3 see D3: fig.4, obj.11; ) or seem to be implementation measures not involving any special technical effect or are well known in the art of cellular communications systems. Hence, the additional features of said claims do either not add anything novel or inventive to claim 1.
- 2.5 The structural features of independent apparatus claim 6 correspond to the already discussed structural features of independent system claim 1 except for one. Claim 6 also differs from D1 in this feature, namely in that the recognition of a localized service area is performed by the mobile station instead of the MSC. But this difference seems to be only one implementation possibility for solving the problem to perform the recognition of moving into a localized service area. Claim 6 does therefore not involve any inventive subject matter.
- 2.6 The additional feature of dependent claim 7 is a measure of a special design. Hence, claim 7 does not add anything inventive to claim 6.
- 2.7 The method steps of independent system claim 8 correspond to the already discussed structural features of independent claim 1. Claim 8 is, therefore, not novel.
- 2.8 The additional method steps of dependent claims 9 and 15 correspond to the already discussed structural features of claims 4 and 2 respectively. Hence, these claims do either not add anything novel or inventive to claim 8.
- 2.9 The additional method steps of dependent claims 10-14 and 16 seem to be measures of a special design not involving any inventive subject matter to be added to independent method claim 8.



**Re Item VI**

**Certain documents cited**

Certain published documents (Rule 70.10 PCT)

Application No Patent No	Publication date (day/month/year)	Filing date (day/month/year)	Priority date (valid claim) (day/month/year)
EP 0 915631	12.5.99	21.8.98	22.8.97
FI 973456	23.2.99		

The priority document of the application was not available at the time of the preliminary examination. It is therefore assumed that the priority of the application is valid in consequence of which the priority document FI 973456 of document EP 98 115 761.3 is not considered as prior art. Said assumption will be invalid if it turns out that the priority of the application is not valid and then the document could become relevant in a later regional or national examination procedure.

**Re Item VII**

**Certain defects in the international application**

- 1 In order to meet the requirements of Rule 6.3(b) PCT the independent claims should be cast in the two-part form, with those features which in combination are disclosed by document D1 should be placed in a preamble Rule 6.3(b)(i) PCT and with the remaining features being included in a characterising part, Rule 6.3(b)(ii) PCT.
- 2 In order to fulfil the requirements of Rule 5.1(a)(ii) PCT, documents D1 to D3 should be identified in the description and the relevant background art disclosed therein should be briefly discussed.
- 3 The description must be brought into conformity with the new claims to be filed, Rule 5.1(a)(iii) PCT.  
Furthermore, following the disclosure of document D1, the statement indicating the technical problem to be solved by the invention, requires revision, which should be effected taking the requirements of Rule 5.1(a)(iii) PCT into account.

- 4 During revision of the application, due care should be taken that the amendments do not go beyond the disclosure in the international application as filed (Article 34(2)(b)).

In order to ease the procedure of proving this, the Applicant should state, on which parts of the originally filed application the amendments by addition, replacement or deletion are based (see Rule 66.8(a) PCT). Additionally, it would be appreciated, if the differences vis-à-vis the prior art and the special effects of said differences would be stated in the reply to this communication.

The Applicant is requested to file amendments by way of replacement pages in the manner stipulated by Rule 66.8(a) PCT. In particular, fair copies of the amendments should be filed in triplicate. Moreover, the Applicant's attention is drawn to the fact that, as a consequence of Rule 66.8(a) PCT the examiner is not permitted to carry out any amendments under the PCT procedure, however minor these may be.

# RECORD COPY PCT

## REQUEST

The undersigned requests that the present international application be processed according to the Patent Cooperation Treaty.

For receiving Office use only

International Application No.

PCT/FI 99 / 0 0 2 27

International Filing Date

23 MAR 1999 (23.03.99)

The Finnish Patent Office  
PCT International Application  
Name of receiving Office and "PCT International Application"

Applicant's or agent's file reference  
(if desired) (12 characters maximum) 47555

### Box No. I TITLE OF INVENTION

Method and system for exploiting location-dependent services in a cellular radio system

### Box No. II APPLICANT

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)

NOKIA TELECOMMUNICATIONS OY  
P.O. Box 300, FIN-00045 Nokia Group,  
Finland

☐ This person is also inventor.

Telephone No.

Facsimile No.

Teleprinter No.

State (that is, country) of nationality:

FI

State (that is, country) of residence:

FI

This person is applicant for the purposes of:

☐ all designated States

☒ all designated States except the United States of America

☐ the United States of America only

☐ the States indicated in the Supplemental Box

### Box No. III FURTHER APPLICANT(S) AND/OR (FURTHER) INVENTOR(S)

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)

PUTKIRANTA, Petteri  
Kelkkämäentie 12, FIN-02610 Espoo, Finland

This person is:

☐ applicant only

☒ applicant and inventor

☐ inventor only (If this check-box is marked, do not fill in below.)

State (that is, country) of nationality:

FI

State (that is, country) of residence:

FI

This person is applicant for the purposes of:

☐ all designated States

☐ all designated States except the United States of America

☒ the United States of America only

☐ the States indicated in the Supplemental Box

☐ Further applicants and/or (further) inventors are indicated on a continuation sheet.

### Box No. IV AGENT OR COMMON REPRESENTATIVE; OR ADDRESS FOR CORRESPONDENCE

The person identified below is hereby/has been appointed to act on behalf of the applicant(s) before the competent International Authorities as:

☒ agent

☐ common representative

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)

BERGGREN OY AB  
P.O. Box 16, FIN-00101 Helsinki, Finland

Telephone No.

+358-9-693701

Facsimile No.

+358-9-6933944

Teleprinter No.

☐ Address for correspondence: Mark this check-box where no agent or common representative is/has been appointed and the space above is used instead to indicate a special address to which correspondence should be sent.

## Box No. V DESIGNATION OF STATES

The following designations are hereby made under Rule 4.9(a) (mark the applicable check-boxes; at least one must be marked):

## Regional Patent

- ☒ AP ARIPO Patent: GH Ghana, GM Gambia, KE Kenya, LS Lesotho, MW Malawi, SD Sudan, SZ Swaziland, UG Uganda, ZW Zimbabwe, and any other State which is a Contracting State of the Harare Protocol and of the PCT
- ☒ EA Eurasian Patent: AM Armenia, AZ Azerbaijan, BY Belarus, KG Kyrgyzstan, KZ Kazakhstan, MD Republic of Moldova, RU Russian Federation, TJ Tajikistan, TM Turkmenistan, and any other State which is a Contracting State of the Eurasian Patent Convention and of the PCT
- ☒ EP European Patent: AT Austria, BE Belgium, CH and LI Switzerland and Liechtenstein, CY Cyprus, DE Germany, DK Denmark, ES Spain, FI Finland, FR France, GB United Kingdom, GR Greece, IE Ireland, IT Italy, LU Luxembourg, MC Monaco, NL Netherlands, PT Portugal, SE Sweden, and any other State which is a Contracting State of the European Patent Convention and of the PCT
- ☒ OA OAPI Patent: BF Burkina Faso, BJ Benin, CF Central African Republic, CG Congo, CI Côte d'Ivoire, CM Cameroon, GA Gabon, GN Guinea, GW Guinea-Bissau, ML Mali, MR Mauritania, NE Niger, SN Senegal, TD Chad, TG Togo, and any other State which is a member State of OAPI and a Contracting State of the PCT (if other kind of protection or treatment desired, specify on dotted line)

National Patent (if other kind of protection or treatment desired, specify on dotted line):

- |  |  |
|--|--|
| <input checked="" type="checkbox"/> AL Albania                               | <input checked="" type="checkbox"/> LS Lesotho                                   |
| <input checked="" type="checkbox"/> AM Armenia                               | <input checked="" type="checkbox"/> LT Lithuania                                 |
| <input checked="" type="checkbox"/> AT Austria                               | <input checked="" type="checkbox"/> LU Luxembourg                                |
| <input checked="" type="checkbox"/> AU Australia                             | <input checked="" type="checkbox"/> LV Latvia                                    |
| <input checked="" type="checkbox"/> AZ Azerbaijan                            | <input checked="" type="checkbox"/> MD Republic of Moldova                       |
| <input checked="" type="checkbox"/> BA Bosnia and Herzegovina                | <input checked="" type="checkbox"/> MG Madagascar                                |
| <input checked="" type="checkbox"/> BB Barbados                              | <input checked="" type="checkbox"/> MK The former Yugoslav Republic of Macedonia |
| <input checked="" type="checkbox"/> BG Bulgaria                              |  |
| <input checked="" type="checkbox"/> BR Brazil                                | <input checked="" type="checkbox"/> MN Mongolia                                  |
| <input checked="" type="checkbox"/> BY Belarus                               | <input checked="" type="checkbox"/> MW Malawi                                    |
| <input checked="" type="checkbox"/> CA Canada                                | <input checked="" type="checkbox"/> MX Mexico                                    |
| <input checked="" type="checkbox"/> CH and LI Switzerland and Liechtenstein  | <input checked="" type="checkbox"/> NO Norway                                    |
| <input checked="" type="checkbox"/> CN China                                 | <input checked="" type="checkbox"/> NZ New Zealand                               |
| <input checked="" type="checkbox"/> CU Cuba                                  | <input checked="" type="checkbox"/> PL Poland                                    |
| <input checked="" type="checkbox"/> CZ Czech Republic                        | <input checked="" type="checkbox"/> PT Portugal                                  |
| <input checked="" type="checkbox"/> DE Germany                               | <input checked="" type="checkbox"/> RO Romania                                   |
| <input checked="" type="checkbox"/> DK Denmark                               | <input checked="" type="checkbox"/> RU Russian Federation                        |
| <input checked="" type="checkbox"/> EE Estonia                               | <input checked="" type="checkbox"/> SD Sudan                                     |
| <input checked="" type="checkbox"/> ES Spain                                 | <input checked="" type="checkbox"/> SE Sweden                                    |
| <input checked="" type="checkbox"/> FI Finland                               | <input checked="" type="checkbox"/> SG Singapore                                 |
| <input checked="" type="checkbox"/> GB United Kingdom                        | <input checked="" type="checkbox"/> SI Slovenia                                  |
| <input checked="" type="checkbox"/> GD Grenada                               | <input checked="" type="checkbox"/> SK Slovakia                                  |
| <input checked="" type="checkbox"/> GE Georgia                               | <input checked="" type="checkbox"/> SL Sierra Leone                              |
| <input checked="" type="checkbox"/> GH Ghana                                 | <input checked="" type="checkbox"/> TJ Tajikistan                                |
| <input checked="" type="checkbox"/> GM Gambia                                | <input checked="" type="checkbox"/> TM Turkmenistan                              |
| <input checked="" type="checkbox"/> HR Croatia                               | <input checked="" type="checkbox"/> TR Turkey                                    |
| <input checked="" type="checkbox"/> HU Hungary                               | <input checked="" type="checkbox"/> TT Trinidad and Tobago                       |
| <input checked="" type="checkbox"/> ID Indonesia                             | <input checked="" type="checkbox"/> UA Ukraine                                   |
| <input checked="" type="checkbox"/> IL Israel                                | <input checked="" type="checkbox"/> UG Uganda                                    |
| <input checked="" type="checkbox"/> IN India                                 | <input checked="" type="checkbox"/> US United States of America                  |
| <input checked="" type="checkbox"/> IS Iceland                               |  |
| <input checked="" type="checkbox"/> JP Japan                                 | <input checked="" type="checkbox"/> UZ Uzbekistan                                |
| <input checked="" type="checkbox"/> KE Kenya                                 | <input checked="" type="checkbox"/> VN Viet Nam                                  |
| <input checked="" type="checkbox"/> KG Kyrgyzstan                            | <input checked="" type="checkbox"/> YU Yugoslavia                                |
| <input checked="" type="checkbox"/> KP Democratic People's Republic of Korea | <input checked="" type="checkbox"/> ZW Zimbabwe                                  |

Check-boxes reserved for designating States (for the purposes of a national patent) which have become party to the PCT after issuance of this sheet:

- |  |   |
|--|---|
| <input checked="" type="checkbox"/> KR Republic of Korea | <input checked="" type="checkbox"/> AE United Arab Emirates     |
| <input checked="" type="checkbox"/> KZ Kazakhstan        | <input checked="" type="checkbox"/> ZA Republic of South Africa |
| <input checked="" type="checkbox"/> LC Saint Lucia       | <input type="checkbox"/>  |
| <input checked="" type="checkbox"/> LK Sri Lanka         |   |
| <input checked="" type="checkbox"/> LR Liberia           |   |

**Precautionary Designation Statement:** In addition to the designations made above, the applicant also makes under Rule 4.9(b) all other designations which would be permitted under the PCT except any designation(s) indicated in the Supplemental Box as being excluded from the scope of this statement. The applicant declares that those additional designations are subject to confirmation and that any designation which is not confirmed before the expiration of 15 months from the priority date is to be regarded as withdrawn by the applicant at the expiration of that time limit. (Confirmation of a designation consists of the filing of a notice specifying that designation and the payment of the designation and confirmation fees. Confirmation must reach the receiving Office within the 15-month time limit.)

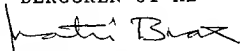
<b>Box No. VI PRIORITY CLAIM</b>		<input type="checkbox"/> Further priority claims are indicated in the Supplemental Box.	
Filing date of earlier application (day/month/year)	Number of earlier application	Where earlier application is:	
		national application: country	regional application:* regional Office
item (1) (23.03.1998) 23 March 1998	980654	Finland (FI)	international application: receiving Office
item (2)			
item (3)			

☒ The receiving Office is requested to prepare and transmit to the International Bureau a certified copy of the earlier application(s) (only if the earlier application was filed with the Office which for the purposes of the present international application is the receiving Office) identified above as item(s): (1)

\* Where the earlier application is an ARIPO application, it is mandatory to indicate in the Supplemental Box at least one country party to the Paris Convention for the Protection of Industrial Property for which that earlier application was filed (Rule 4.10(b)(ii)). See Supplemental Box.

<b>Box No. VII INTERNATIONAL SEARCHING AUTHORITY</b>			
Choice of International Searching Authority (ISA) (if two or more International Searching Authorities are competent to carry out the international search, indicate the Authority chosen; the two-letter code may be used):	Request to use results of earlier search: reference to that search (if an earlier search has been carried out by or requested from the International Searching Authority):		
ISA / SE	Date (day/month/year)	Number	Country (or regional Office)

<b>Box No. VIII CHECK LIST: LANGUAGE OF FILING</b>	
This international application contains the following number of sheets:	This international application is accompanied by the item(s) marked below:
request : 3	1. <input checked="" type="checkbox"/> fee calculation sheet
description (excluding sequence listing part) : 11	2. <input checked="" type="checkbox"/> separate signed power of attorney
claims : 3	3. <input checked="" type="checkbox"/> copy of general power of attorney; reference number, if any:
abstract : 1	4. <input type="checkbox"/> statement explaining lack of signature
drawings : 3	5. <input type="checkbox"/> priority document(s) identified in Box No. VI as item(s):
sequence listing part of description :	6. <input type="checkbox"/> translation of international application into (language):
Total number of sheets : 21	7. <input type="checkbox"/> separate indications concerning deposited microorganism or other biological material
	8. <input type="checkbox"/> nucleotide and/or amino acid sequence listing in computer readable form
	9. <input checked="" type="checkbox"/> other (specify): Copy of Official Action in FI980654
Figure of the drawings which should accompany the abstract: 1	Language of filing of the international application: Finnish

<b>Box No. IX SIGNATURE OF APPLICANT OR AGENT</b>	
<small>Next to each signature, indicate the name of the person signing and the capacity in which the person signs (if such capacity is not obvious from reading the request).</small>	
BERGGREN OY AB  Matti Brax Patent Agent  Helsinki, 23 March 1999	

For receiving Office use only		2. Drawings:  <input type="checkbox"/> received:  <input type="checkbox"/> not received:
1. Date of actual receipt of the purported international application:	23 MAR 1999 (23 -03- 1999)	
3. Corrected date of actual receipt due to later but timely received papers or drawings completing the purported international application:		
4. Date of timely receipt of the required corrections under PCT Article 11(2):		
5. International Searching Authority (if two or more are competent): ISA / SE	6. <input type="checkbox"/> Transmittal of search copy delayed until search fee is paid.	

## **Menetelmä ja järjestelmä sijainnista riippuvien palvelujen käyttämiseksi solukkoradiojärjestelmässä**

5 Keksintö koskee yleisesti verkon tarjoamien palvelujen järjestämistä ja toimittamista päätelaitteelle. Erityisesti keksintö koskee päätelaitteen sijaintia koskevan tiedon hyödyntämistä palvelujen järjestämisessä.

10 Nykyaikainen tiedonsiirtoverkko tarjoaa päätelaitteiden haltijoille verkon välityksellä yksilöllisiä, ohjelmallisesti muutettavissa olevia palveluja. Digitaalinen puhelinverkko on eräs tällainen tiedonsiirtoverkko. Tunnettuja sen tarjoamia palveluja ovat esimerkiksi ohjelmoitava soitonsiirto ja puhepostijärjestelmä, jotka toteutetaan tavallisesti puhelinkeskuksen yhteydessä. Tunnetaan myös verkkoja, joissa tietyt palvelut toimittaa ulkopuolinen palveluntarjoaja, joka maksaa tiedonsiirtoverkkoa ylläpitävälle operaattorille korvauksen verkon käytöstä ja jonka tarjoamat palvelut sijaitsevat fyysisesti muualla kuin puhelinkeskusten yhteydessä. Tässä patenttihakemuksessa käsitellään esimerkinomaisena tiedonsiirtoverkkona digitaalista solukkoradiojärjestelmää.

20 Tunnetuissa verkoissa palvelujen tarjonta ei aikaisemmin ole riippunut siitä, mistä verkon osasta käyttäjä ottaa yhteyden palvelua tarjoavaan laitteeseen tai laitteistoon. Erään viimeaikaisen ehdotuksen mukaisesti voidaan kuitenkin määritellä päätelaitteelle erilaisia sijainteja verkossa. Kun päätelaite tällöin rekisteröityy tiettyyn soluun, sen rekisteröitymisen yhteydessä saama palvelu voi olla erilaista sijainnin mukaan. Eri tilanteissa olisi kuitenkin edullista, jos päätelaitteen käyttäjälle voitaisiin tarjota erilaista palvelua sen mukaan, missä hän fyysisesti sijaitsee, myös verkon aloitteesta ilman päätelaitteen erikseen ottamaa yhteyttä verkkoon. Tällaisia palveluja nimitetään verkon initioimiksi palveluiksi ja sellaisia ovat mm. niinsanotut push-palvelut, joissa jokin verkkoon kytketty laite lähettää päätelaitteille tietoja ilman, että päätelaitteet pyytävät kyseisiä tietoja. Esimerkki alueellisesti järjestetystä push-palvelusta, joka tekniikan tason mukaisissa ratkaisuissa ei onnistu, on työmaaruokalan päivän ruokalistan tiedottaminen päätelaitteiden välityksellä kaikille niille työntekijöille, jotka lounasajan lähestyessä ovat yrityksen toimitilojen alueella.

Esillä olevan keksinnön tavoitteena on esittää menetelmä ja järjestelmä verkon tarjoamien palvelujen saattamiseksi käyttäjän ulottuville eri tavoin riippuen käyttäjän sijainnista.

Keksinnön tavoitteet saavutetaan tallentamalla päätelaitteen muistiin tiedot, joiden perusteella se tunnistaa olevansa tietyllä paikallisella palvelualueella, ja ohjelmomalla päätelaite vasteena tällaiseen tunnistukseen lähettämään asiaa koskeva viesti tietyille palveluja tarjoavalle laitteelle.

- 5 Keksintö kohdistuu tiedonsiirtojärjestelmään, joka käsittää tukiasemia tiedonsiirto-yhteyksien tarjoamiseksi liikkuville päätelaitteille. Sille on tunnusomaista, että se käsittää ainakin yhden paikallisen palvelualueen sekä välineet tietylle päätelaitteelle tiedonsiirtojärjestelmän aloitteesta tarjottavan palvelutarjonnan muuttamiseksi vas-  
10 teena tietoon kyseisen päätelaitteen saapumisesta mainitulle paikalliselle palvelualueelle.

- Keksintö kohdistuu myös solukkoradiojärjestelmän päätelaitteeseen, joka käsittää ohjauslohkon ja muistivälineet. Sille on tunnusomaista, että sen muistivälineet on sovitettu tallentamaan tarvittavat tiedot tietyn paikallisen palvelualueen tunnistamiseksi, jolloin päätelaite on järjestetty - vasteena paikallisen palvelualueen tunnistamiseen - lähettämään ilmoitus saapumisestaan kyseiselle paikalliselle palvelualueelle, mainitun ilmoituksen ollessa tarkoitettu herätteeksi päätelaitteelle tarjottavan palvelutarjonnan muuttamista varten.

- Edelleen keksintö kohdistuu menetelmään päätelaitteelle tarjottavan palvelutarjonnan muuttamiseksi tiedonsiirtojärjestelmässä, joka käsittää tukiasemia tiedonsiirto-yhteyksien tarjoamiseksi liikkuville päätelaitteille. Menetelmälle on tunnusomaista, että se käsittää vaiheet, joissa

- muodostetaan tieto tietyn päätelaitteen saapumisesta tietylle paikalliselle palvelu-  
alueelle ja
- muutetaan kyseiselle päätelaitteelle tiedonsiirtojärjestelmän aloitteesta tarjottavaa  
25 palvelutarjontaa.

- Keksinnön mukaisesti päätelaitteille määritellään tietyjä paikallisia palvelualueita (LSA; Localised Service Area), jotka voivat olla puhtaasti maantieteellisiä alueita tai joihin voi liittyä jotain muita määreitä. Paikallinen palvelualue voi olla määritelty paikkatiedon lisäksi tai asemesta esimerkiksi ajallisesti. Paikkatiedolla tarkoitetaan yleisesti johonkin paikkaan tai alueeseen liittyviä määrittelyjä: paikallinen palvelu-  
30 alue voi käsittää yhden tukiaseman solun, useita soluja, tietyn sijaintialueen (LA; Location Area), tietyn verkon (PLMN; Public Land Mobile Network), tiettyjen koordinaattien avulla määritellyn alueen, tietyt solun tunnisteet tai jonkin sellaisen alueen, jolla tukiasemat lähettävät päätelaitteille jonkin muun tunnisteiden. Myös näiden vaihtoehtojen yhdistelmiä voidaan käyttää.

- Päätelaitteen muistiin tallennetaan tieto siitä, miten se voi tunnistaa olevansa tietyllä paikallisella palvelualueella. Koska palvelut liittyvät yleensä tavalla tai toisella liittymäsopimukseen, jossa käyttäjä saa tietyt käyttäjäkohtaiset oikeudet tiedonsiirto-verkon käyttöön, edullisinta on tallentaa paikallisen palvelualueen tunnistamiseen
- 5 liittyvät tiedot käyttäjän SIM-korttiin (Subscriber Identity Module) tai vastaavaan muistivälineeseen, joka on tarkoitettu nimenomaan tietyn käyttäjän yksilöimiseen hänen käyttämästään laitteesta riippumatta. Vasteena positiiviseen tunnistukseen käyttäjän päätelaite lähettää tietyn sanoman, jonka se osoittaa paikallisten palvelujen tarjoamisesta vastaavalle laitteelle verkossa. Tällä sanomalla päätelaite ilmoittaa,
- 10 että käyttäjä on tietyllä paikallisella palvelualueella. Sanoman perusteella verkko pystyy tarjoamaan käyttäjälle juuri niitä palveluja, jotka ovat tarpeen kyseisellä paikallisella palvelualueella. Kun päätelaite siirtyy muualle, se ilmoittaa vastaavanlaisella sanomalla poistuvansa paikalliselta palvelualueelta. Verkko voi myös automaattisesti katsoa päätelaitteen poistuneen tietyn ehdon täyttyessä. Tällaisia ehtoja
- 15 ovat esimerkiksi
- päätelaite ei vastaa seuraavaan kyseisellä paikallisella palvelualueella lähetettyyn kutsuviestiin (engl. paging message) tai muuhun viestiin,
  - päätelaite ei kuittaa tiettyä sille osoitettua datapakettia,
  - päätelaite ei lähetä tietyn ajan kuluessa uutta sellaista viestiä, jolla se ilmoitti saapumisestaan paikalliselle palvelualueelle, tai
  - päätelaite ei lähetä tietyn ajan kuluessa jotain muuta ajoittain lähetettäväksi määrättyä viestiä, kuten sijainnin päivitysviestiä (PLU; Periodic Location Update message).
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- Laite, jolle päätelaite osoittaa sijainnistaan kertovan viestin, voi olla operaattorin tai ulkopuolisen palveluntarjoajan ylläpitämä. Viesti voi olla muodoltaan lyhytsanoma eli SMS-viesti (Short Message Service), rakenteeton datasanoma eli USSD-viesti (Unstructured Supplementary Service Data), tavallisessa puhelinyhteydessä välitetty DTMF-koodattu viesti (Dual Tone MultiFrequency) tai datapuhelu. Vasteena viestiin laite, jolle päätelaite osoittaa sijainnistaan kertovan viestin, voi esimerkiksi lähettää päätelaitteelle tiettyjä kyseistä aluetta koskevia tietoja tai aloittaa tällaisten tietojen säännöllisen tai ajoittaisen lähettämisen, jota jatkuu niin pitkään kuin päätelaite pysyy samalla paikallisella palvelualueella. Edelleen palveluja tarjoava laite voi kytkeä jonkin muun paikallisesti määritellyn palvelun käyttöön tai pois käytöstä, lähettää tiedon päätelaitteen sijainnista muille sellaisille laitteille, joiden toimintaan
- 30 päätelaitteen sijainti vaikuttaa, tai tehdä jonkin muun toimenpiteen. Eräs vaihtoehto on, että päätelaitteille määritellään tietty paikallinen palveluprofiili, joka voi käsittää erilaisia tekijöitä aina puhelujen hinnoittelusta datapuheluissa käytettäviin datano-
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peuksiin tai yhteyksien muodostuksessa ja ylläpidossa käytettävään priorisointiin asti. Palveluprofiilin soveltamista säätelee tällöin päätelaitteen sijainti tietyllä paikallisella palvelualueella.

- Seuraavassa selostetaan keksintöä yksityiskohtaisemmin viitaten esimerkkinä esitettyihin edullisiin suoritusmuotoihin ja oheisiin kuviin, joissa
- 5 kuva 1 esittää erästä keksinnön mukaista tiedonsiirtojärjestelmää,
  - kuva 2 esittää viestien välitystä eräässä kuvan 1 mukaisessa tiedonsiirtojärjestelmässä,
  - kuva 3 esittää erästä toista keksinnön mukaista tiedonsiirtojärjestelmää,
  - 10 kuva 4 esittää erästä keksinnön mukaista päätelaitetta ja
  - kuva 5 esittää erästä keksinnön mukaisen menetelmän suoritusmuotoa.

- Kuvassa 1 on esitetty solukkoradiojärjestelmä 100, jossa on sinänsä tunnetulla tavalla tukiasemia (BTS; Base Transceiver Station) 101, tukiasemaohjaimia (BSC; Base Station Controllor) 102 ja matkapuhelinkeskuskuksia (MSC; Mobile Switching Centre)
- 15 103. Päätelaite (MS; Mobile Station) 104 on radioyhteydessä ainakin yhteen tukiasemaan 101, jolloin se sijaitsee järjestelmän kannalta sillä sijaintialueella (LA; Location Area) 105, johon kyseisen tukiaseman kattavuusalue eli solu kuuluu. Sijaintialue voi käsittää yhden tai useampia soluja. Päätelaitteiden sijaintitietojen ylläpitämistä ja puhelujen reitittämistä varten järjestelmään kuuluu kotialuerekistereitä
  - 20 (HLR; Home Location Register) 106 ja vierailijarekistereitä (VLR; Visitor Location Register) 107, jotka sijaitsevat tavallisesti matkapuhelinkeskusten yhteydessä. Kuvan 1 mukaisessa järjestelmässä solukkoradioverkko on liitetty johdinyhteyksin myös tietty palvelupalvelin (SS; Service Server) 108 sekä joitakin sovelluspalvelimia (AS; Application Server) 109. Yhteydet solukkoradioverkosta palvelimiin 108
  - 25 ja 109 voivat olla joko suoria, jolloin palvelimet on tavallaan liitetty osaksi solukkoradiojärjestelmää, tai ne voidaan reitittää yleisen puhelinverkon (PSTN; Public Switched Telephone Network) 110 kautta. Suorat yhteydet tulevat kyseeseen lähinnä silloin, kun palvelimia 108 ja 109 ylläpitää sama operaattori, joka vastaa solukkoradiojärjestelmän toiminnasta.

- 30 Keksinnön mukaisen toiminnan edellytyksenä on tavalla tai toisella muodostettava tieto siitä, että tietty päätelaite sijaitsee tietyllä, sille määritellyllä paikallisella palvelualueella 111. Kuten edellä on mainittu, paikallinen palvelualue voi olla sama kuin tietty sijaintialue, mutta mikään ei estä määrittelemästä paikallisia palvelualueita myös kokonaan eri tavalla; kuvassa 1 paikallinen palvelualue 111 käsittää tukiasemia kahden eri tukiasemaohjaimen alaisuudesta. Keksinnön ensimmäisen suoritusmuodon mukaisesti palvelualue koostuu kuitenkin aina tietty(i)stä solu(i)sta. Siinä
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tapauksessa, että tukiaseman kattavuusalue voidaan tukiaseman käyttämällä suuntaavilla antenneilla jakaa tukiaseman ympärille keskittyvää solua pienempiin soluihin tai lohkoihin, jotka ovat järjestelmän kannalta loogisesti erotettavissa toisistaan, paikallisen palvelualueen määrittelyssä voidaan hyödyntää myös näitä pienempiä alueita. Tieto päätelaitteen sijainnista tietyllä palvelualueella voidaan tällöin muodostaa joko päätelaitteessa, mitä pidetään keksinnön edullisempänä suoritusmuotona, tai järjestelmän kiinteissä osissa. Jälkimmäisen vaihtoehdon rajoituksena on se, että koska tunnetut solukkoradiojärjestelmät ylläpitävät tietoja päätelaitteiden sijainnista vain sijaintialueen tarkkuudella, paikallisen palvelualueen määrittäminen muun kuin vähintään yhden sijaintialueen kokoiseksi edellyttäisi järjestelmän toiminnan muuttamista.

Oletetaan siis, että tieto päätelaitteen sijainnista tietyllä palvelualueella muodostetaan päätelaitteessa itsessään. Tähän on olemassa useita sinänsä tunnettuja menetelmiä, jotka yleensä perustuvat siihen, että kukin tukiasema lähettää tunnetuissa solukkoradiojärjestelmissä koko solun alueella vastaanotettavissa olevia yleisiä ohjaustietoja, joista käy ilmi mm. tukiaseman yksikäsitteinen tunniste tai muu tukiasemalle ominainen tieto. Päätelaitteeseen on etukäteen tallennettu jokin menetelmä tiettyjen tukiasemakohtaisten tunnisteiden havaitsemiseksi. Yksinkertaisimmillaan päätelaitteen muistiin on tallennettu luettelo niiden tukiasemien tunnisteista, joiden solut muodostavat halutun paikallisen palvelualueen. Vertaamalla vastaanottamaansa tunnistetta muistissa olevaan luetteloon päätelaite saa selville, onko se tietyllä paikallisella palvelualueella. Erään vaihtoehdoisen suoritusmuodon mukaisesti päätelaitteen muistiin on tallennettu vain tietty maski, jolla se valitsee tietyt merkit tukiasemakohtaisesta tunnisteesta tarkasteltaviksi. Jos tarkasteltavat merkit muodostavat tietyn kuvion tai noudattavat tiettyä kaavaa, tukiaseman solu kuuluu paikalliseen palvelualueeseen. Tämän suoritusmuodon etuna on se, että jos paikallisen palvelualueen tiedonsiirtokapasiteettia parannetaan perustamalla alueelle uusi tukiasema, uuden tukiaseman tunnistetta ei tarvitse erikseen ilmoittaa jokaiselle sellaiselle päätelaitteelle, jolle kyseinen paikallinen palvelualue on määriteltä; riittää, kun uuden tukiaseman tunnisteesta maskilla valittavat merkit ovat samat tai vastaavat kuin muissa saman paikallisen palvelualueen tukiasemissa.

Keksinnön toisen suoritusmuodon mukaisesti paikallinen palvelualue ei ole varsinaisesti sidottu tukiasemien soluihin vaan sillä on tietyt maantieteelliset koordinaatit. Tässä suoritusmuodossa päätelaite voi havaita olevansa tietyllä palvelualueella esimerkiksi siten, että kukin tukiasema lähettää yleisten ohjaustietojensa mukana tiedon kyseisen tukiaseman sijainnista maantieteellisessä koordinaatistossa. Päätelai-

- te voi koordinaatit vastaanotettuaan tutkia, sijaitseeko koordinaattien ilmaisema piste päätelaitteelle määritellyn paikallisen palvelualueen sisäpuolella. Monipuolisemmassa menetelmässä päätelaite voi vastaanottaa koordinaatit kaikilta niiltä tukiasemilta, joiden lähettämiä yleisiä ohjaustietoja se pystyy vastaanottamaan, ja olettaa omaksi sijainnikseen vastaanottamiensa koordinaattien keskiarvon. Vertaamalla laskemaansa sijaintia tallennettuihin paikallisen palvelualueen maantieteellisiin määrittämiin päätelaite havaitsee, onko se paikallisella palvelualueella vai ei. Tulevaisuudessa päätelaitteet voivat monipuolistua niin paljon, että päätelaite sisältää GPS-vastaanottimen (Global Positioning System) tai muun täysin tukiasemista riippumattoman välineen päätelaitteen sijainnin määrittämiseksi maantieteellisessä koordinaatistossa. Tämä mahdollistaa paikallisen palvelualueen määrittämisen täysin riippumatta solukkoradiojärjestelmän soluista.

- Keksinnön kolmannen suoritusmuodon mukaisesti paikallisen palvelualueen määrittelyyn otetaan mukaan aikaulottuvuus. Jos solukkoradiojärjestelmässä on solut A, B, C, D ja E, voidaan määrittellä, että tietty paikallinen palvelualue sisältää ympäri vuorokauden solut A ja B, mutta solun C vain kello 12:n ja 15:n välillä ja solut D ja E keskiviikkoisin, perjantaisin ja lauantaisin kello 18:sta illalla kello 03:een seuraavana aamuna. Aikaulottuvuus voidaan luonnollisesti yhdistää myös edellä esitettyyn soluista riippumattomaan maantieteelliseen määrittelyyn.

- Kuvassa 2 on oletettu, että tieto päätelaitteen sijainnista tietyllä palvelualueella muodostetaan päätelaitteessa sellaisen tukiasemakohtaisen tunnisteiden perusteella, jonka päätelaite vastaanottaa tukiasemalta. Kuvassa on esitetty yksinkertaistettuna keksinnön edullisen suoritusmuodon mukaiseen toimintaan liittyvä viestien vaihto päätelaitteen 104, tukiaseman 101, palvelupalvelimen 108 ja sovelluspalvelimen 109 välillä. Viestit on esitetty nuolilla ja niiden aikajärjestys on kuvassa ylhäältä alaspäin. Viesti 201 on tukiaseman lähettämä sinänsä tunnettu yleinen ohjaustieto, joka sisältää tukiasemakohtaisen tunnisteiden ja jonka päätelaite vastaanottaa. Esimerkinomaisia yleisiä ohjaustietoja ovat GSM-järjestelmän (Global System for Mobile telecommunications) tukiasemien lähettämät tiedot BCCH-kanavalla (Broadcast Control Channel). Lohko 202 tarkoittaa päätelaitteessa tapahtuvaa vertaamista tunnisteluetteloon tai muuta vastaavaa toimintaa, jonka perusteella päätelaite havaitsee saapuneensa tietylle paikalliselle palvelualueelle. Vasteena tähän havaintoon päätelaite lähettää palvelupalvelimelle viestin 203, jossa se ilmaisee jonkin päätelaitteelle ominaisen tunnisteiden, esimerkiksi päätelaitteen SIM-korttiin tallennetun IMSI-koodin (International Mobile Subscriber Identifier) tai MS-ISDN-numeron (Mobile Subscriber Integrated Services Digital Network number).

- Keksintö ei rajoita sitä, missä muodossa viesti 203 lähetetään. Eräs edullinen vaihtoehto on SMS-viesti, jonka vastaanottajan numeroksi päätelaite valitsee muistista lukemansa palvelupalvelimen puhelinnumeron. Toinen vaihtoehto on useissa digitaalisissa solukkoradiojärjestelmissä määritelty vapaamuotoinen datasanoma, jota
- 5 GSM-järjestelmässä nimitetään USSD-viestiksi. Päätelaite voi myös ilman käyttäjältä edellytettäviä toimenpiteitä muodostaa puhelu yhteyden palvelupalvelimeen ja lähettää viestin 203 DTMF-koodattuna tai datapuheluna.

- Palvelupalvelimen rooli kuvan 2 mukaisessa keksinnön suoritusmuodossa on ylläpitää tietoja siitä, mitkä päätelaitteet ovat milläkin paikallisella palvelualueella ja mitä
- 10 palveluja niille tämän perusteella tulee tarjota. Varsinaisen palvelun tarjoaa sovelluspalvelin. Kun siis palvelupalvelin on vastaanottanut viestin 203, se lukee muististaan, mitä palveluja kyseiselle päätelaitteelle on kyseisellä paikallisella palvelualueella tarjottava, ja lähettää palvelun tarjoamispyynnön 204 oikealle sovelluspalvelimelle. Tieto siitä, mitä palveluja mikäkin sovelluspalvelin tarjoaa, on niinikään tal-
- 15 lennettu palvelupalvelimen muistiin, jotta se osaa lähettää palvelun tarjoamispyynnön 204 oikealle sovelluspalvelimelle. Keksintö ei rajoita sitä, missä muodossa palvelun tarjoamispyyntö 204 lähetetään. Tekniikan tasosta tunnetaan runsaasti menetelmiä tiedonsiirron toteuttamiseksi kahden tiettyyn tiedonsiirtoverkkoon kytketyn palvelimen välillä.

- 20 Vasteena palvelun tarjoamispyyntöön 204 sovelluspalvelin tarjoaa päätelaitteelle tietyn palvelun, mitä esittää kuvassa 2 yksinkertaisesti nuoli 205. Palvelu ei välttämättä ole mikään yksinkertainen viesti eikä sen aloittaminen välttämättä sisällä pelkästään päätelaitteelle lähetettävää informaatiota. Paikallisella palvelualueella voi olla päätelaitteelle määriteltynä kokonainen palveluprofiili, joka voi sisältää esimerkiksi
- 25 - puhelujen hinnoittelun tai priorisoinnin,  
 - rajoituksia koskien tukiaseman ja päätelaitteen välillä sovellettavaa modulaatiomenetelmää, datasiirtonopeutta ja/tai yhteyden laatuvaatimusta,  
 - tulevien sähköpostien reitittämisen käyttäjän kiinteän työaseman asemesta kannettavaan päätelaitteeseen tai
- 30 - automaattisen soitonsiirron ja/tai puhepostipalvelun kytkemisen päälle tai pois.

- Päätelaite voi myös olla oikeutettu tai velvoitettu vastaanottamaan tietyllä paikallisella palvelualueella säännöllisesti viestejä koskien esimerkiksi säätilaa, liikennetilannetta, pörssikursseja tai muuta sellaista. Sovelluspalvelin voi näin ollen ottaa
- 35 nuolen 205 kuvaamassa vaiheessa hyvinkin monipuolisesti yhteyksiä erilaisiin, so-lukkojärjestelmään kuuluviin tai sen kanssa tiedonsiirtoyhteydessä oleviin laitteisiin.

Toisaalta palvelupalvelimen muistiin voi olla tallennettuna ohjeet palvelujen pyytämiseksi useammalta kuin yhdeltä sovelluspalvelimelta, mikä tarkoittaisi, että nuolten 204 kuvaamia viestejä lähetettäisiin useita ja niiden kohteina olisi useampia sovelluspalvelimia.

- 5 Kuvassa 2 on edelleen oletettu, että päätelaite poistuu paikalliselta palvelualueelta hallitun solunvaihdon (engl. cell reselection) mukaisesti, jolloin se lähettää palvelu-
- 10 palvelimelle ilmoituksen 206 siitä, että se poistuu palvelualueelta. Vasteena poistumisilmoitukseen palvelupalvelin lähettää sovelluspalvelimelle pyynnön 207 palvelun lopettamisesta. Päätelaite voi lähettää nuolen 206 kuvaaman ilmoituksen vanhan tukiaseman kautta aina, kun se on poistumassa sellaisesta solusta, joka kuuluu paikalliseen palvelualueeseen, riippumatta siitä, kuuluuko uusikin solu samaan paikalliseen palvelualueeseen. Vaihtoehtoisessa suoritusmuodossa päätelaite tutkii aina solunvaihdon jälkeen, onko se edelleen samalla paikallisella palvelualueella, ja jos ei ole, se lähettää uuden tukiaseman kautta palvelupalvelimelle ilmoituksen poistumisestaan. Edelleen erään toisen vaihtoehtoisen suoritusmuodon mukaisesti päätelaitteet eivät lähetä poistumisilmoituksia lainkaan, vaan päätelaitteen poistuminen tiettyltä paikalliselta palvelualueelta havaitaan järjestelmän kiinteiden osien toimesta esimerkiksi siten, että päätelaite ei enää vastaa kutsuviestiin tai muuhun sille lähetettyyn viestiin kyseisellä paikallisella palvelualueella tai lähetä solukkojärjestelmän määritysten mukaista ajoittaista sijainnin päivitysilmoitusta tai muuta ajoittain lähetettäväksi määrättyä ilmoitusta, tai siten, että palvelupalvelin lähettää säännöllisesti tai ajoittain kaikille tietyn paikallisen palvelualueen päätelaitteille lyhyen datasanomman, joka päätelaitteen on kuittattava; kuittauksen poisjäänti ilmaisee, ettei päätelaite ole enää kyseisellä paikallisella palvelualueella.
- 25 Edellä on esitetty, että tietyllä paikallisella palvelualueella päätelaite saa tietyn palvelun. Voidaan kuitenkin myös määritellä sellaisia palvelualueita, joille on ominaista, että päätelaite ei saa tiettyä sellaista palvelua, jonka se muualla saisi. Päätelaitteelle voidaan määrittää useita palvelualueita ja kuhunkin niistä liittyen erilaisia toimintaohjeita. Palvelupalvelin, jolle päätelaite lähettää tiedon saapumisestaan tiettylle paikalliselle palvelualueelle, voi olla aina sama tai joillakin paikallisilla palvelualueilla eri. Jo pelkästään se, ilmaiseeko päätelaite saapumisensa tietylle paikalliselle palvelualueelle ja jos ilmaisee, kuinka nopeasti, voi riippua palvelualueesta. Käyttäjälle voidaan antaa valinnan vapaus sen suhteen, ilmoitetaanko saapuminen tietylle paikalliselle palvelualueelle vai ei. Päätelaite voi jopa ilmaista käyttäjälle, että nyt on saavuttu tietylle paikalliselle palvelualueelle, ja pyytää lupaa saapumisilmoituksen lähettämiseen. Luvan kysymiseen voidaan yhdistää käyttäjälle annetta-
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va lyhyt kuvaus siitä, mitä seurauksia saapumisilmoituksen lähettämisestä olisi. Toisaalta tietyt paikalliset palvelualueet voidaan määritellä operaattorin toimesta ilmoitusvelvollisuuden alaisiksi, jolloin päätelaitteen on pakko lähettää saapumisilmoitus joka kerran saapuessaan kyseiselle paikalliselle palvelualueelle riippumatta käyttäjän mielipiteestä.

Edellä on esitetty, että palvelupalvelin ja sovelluspalvelin olisivat erillisiä laitteita. Nämä toiminnot voidaan kuitenkin myös yhdistää yhteen laitteeseen, jolloin edellä esitetty tiedonsiirto palvelimien välillä supistuu palvelimen sisäiseksi tiedonsiirroksi. Jompikumpi tai molemmat voidaan myös toteuttaa jonkin sinänsä tunnetun, solukkoradiojärjestelmään muutenkin kuuluvan laitteen yhteydessä. Palvelimia voidaan edullisimmin yhdistää matkapuhelinkeskuksiin tai tukiasemaohjaimiin.

Kuva 3 esittää erästä keksinnön keksinnön mukaista tiedonsiirtojärjestelmää 300, jossa tietyn yleisen matkaviestinjärjestelmän (PLMN) 301 alaisuudessa toimii tiheästi liikennöidyllä alueella eräs paikallinen palvelu (LCS; Localized Cellular Services) 302, jota ylläpitävää matkapuhelinkeskusta nimitetään LCS-SC:ksi (LCS Switching Centre) 303. LCS-SC toimii sinänsä kuten tunnettu matkapuhelinkeskus. Se järjestää LCS:n sisäisen tietoliikenteen ja muodostaa, ylläpitää ja lopettaa yhteydet LCS:ssä olevien ja muualla sijaitsevien päätelaitteiden välillä. LCS-SC:n yhteydessä toimii vierailijarekisteri 304 ja yhdistetty palvelu- ja sovelluspalvelin 305, jota nimitetään yksinkertaisesti palvelimeksi. Tässä keksinnön suoritusmuodossa paikallinen palvelualue 306 kattaa kaikki LCS-SC:n alaisuudessa toimivat tukiasemat (yksinkertaisuuden vuoksi tukiasemaohjaimia ei ole erikseen esitetty kuvassa). Havainto tietyn päätelaitteen saapumisesta paikalliselle palvelualueelle tehdään aikaisemmasta poiketen verkon kiinteissä osissa, tarkemmin sanoen vierailijarekisterissä 304. Oletetaan, että kuvan esittämä solukkoalijärjestelmä toimii lentokentällä. Lentoyhtiöt voivat ilmoittaa vierailijarekisteriin 304 niiden asiakkaidensa matkapuhelinnumerot tai muut tunnisteet, joille on myönnetty kanta-asiakkuuden ansiosta tiettyjä etuja. Kun vierailijarekisteri 304 havaitsee, että tällaisen tunnisteiden omaava päätelaite on saapunut solukkoalijärjestelmän alueelle, se lähettää palvelimelle 305 tiedon asiasta. Vierailijarekisterin asemesta tai lisäksi viestin lähettämiseen voivat osallistua muutkin kiinteät verkkolaitteet. Vasteena saamaansa tietoon palvelin 305 alkaa lähettää kyseiselle päätelaitteelle sellaisia tiedotuksia, jotka on tarkoitettu vain lentoyhtiöiden etuoikeutetuille asiakkaille. Tiedotukset välitetään tällöin edullisimmin SMS-viesteinä.

SMS-viestien lähetys tapahtuu tunnetuissa digitaalisissa puhelinjärjestelmissä tiettyjen SMS-palvelukeskusten kautta eikä suoraan laitteelta laitteelle. Yksinkertaisuus-

den vuoksi SMS-palvelukeskuksia ei kuitenkaan ole esitetty edellä, vaan niiden hyväksikäytön katsotaan tapahtuvan sinänsä alan ammattimiehen tuntemalla tavalla. Myös muita edellä esitettyjä viestejä voidaan välittää laitteesta toiseen erilaisten sinänsä tunnettujen välinlaitteiden kautta.

- 5 Kuva 4 esittää yksinkertaistettuna erään keksinnön mukaisen päätelaitteen ohjauslohkoa ja eräitä muistiosia. Ohjauslohko 401 on edullisimmin mikroprosessori, joka sijoittuu päätelaitteessa sinänsä tunnetulla tavalla niin, että päätelaitteen vastaanot-
- 10 tama muu kuin suoraan käyttäjälle toistettavaksi aiottu data ohjautuu vastaanotinketjusta RX ohjauslohkoon ja vastaavasti ohjauslohkon tuottama lähetettävä data ohjautuu päätelaitteen lähetinketjuun TX yhdessä suoraan käyttäjältä tulevan datan (esimerkiksi digitoidun puheen) kanssa. Ohjauslohkon käytettävissä on kuvan 4 mukaisessa päätelaitteessa kiinteä muisti 402 ja irrotettava muistiyksikkö 403, joka on esimerkiksi älykortti. Ohjauslohko 401 saa myös syöttötietoja näppäimistöltä 404 ja se tulostaa tietoja näyttöön 405. Kiinteään muistiin 402 on tallennettu ohjelma, jota
- 15 ohjauslohko 401 suorittaa. Osana kyseistä ohjelmaa on käsky etsiä ohjelmalaajenuksia irrotettavasta muistiyksiköstä 403. Keksinnön mukaista toimintaa varten irrotettavaan muistiyksikköön on tallennettu ohjelma 406, jolla päätelaite pystyy käyttämään paikallisia palvelualueita, sekä tiedot 407, 408 ainakin yhdestä paikallisesta palvelualueesta (LSA1, LSA2). Kuvassa 4 on oletettu, että paikallisen palvelualueen
- 20 tunnistaminen perustuu siihen, että päätelaite vertaa vastaanotettuja tukiasemien tunnisteita (BTS ID) muistiin tallennettuun paikallisten palvelualueiden tukiasemien luetteloon. Kutakin paikallista palveluasemaa kohti irrotettava muistiyksikkö 403 sisältää myös tietyn palvelupalvelimen tunnisteen (SS ID).

- Kuva 5 esittää keksinnön erään edullisen suoritusmuodon mukaiseen menetelmään
- 25 liittyvää toimintaa päätelaitteessa, palvelupalvelimessa ja sovelluspalvelimessa. Päätelaite havaitsee lohkon 501 mukaisesti sen, että solu vaihtuu. Se tutkii lohossa 502, tapahtuuko paikallisten palvelualueiden suhteen muutoksia eli saapuuiko se paikalliselle palvelualueelle (jos se ei ole tähän asti ollut sellaisella) tai poistuuiko se paikalliselta palvelualueelta (jos se on tähän asti ollut sellaisella). Muutos liipaisee
- 30 lohkon 503 mukaisesti viestin lähettämisen palvelupalvelimelle, jonka toiminta alkaa lohkon 504 mukaisesti viestin vastaanottamisesta. Lohkon 505 mukaisesti palvelupalvelin tutkii, onko kyseinen päätelaite palveltavien listalla. Jos päätelaite on saapumassa paikalliselle palvelualueelle, se havaitaan lohossa 505 päätelaitteeksi, jolle on tarjottava palvelua. Jos taas päätelaite on poistumassa paikalliselta palvelualueelta, se havaitaan lohossa 505 päätelaitteeksi, jolle tarjottava palvelu on lopetettava. Vastaava viesti lähetetään lohkon 506 mukaisesti sovelluspalvelimelle, joka
- 35

vastaanottaa viestin lohossa 507 ja tutkii lohossa 508, koskeeko viesti palvelun aloittamista vai lopettamista. Kyseisen päätelaitteen osalta palvelu joko aloitetaan 509 tai lopetetaan 510 tilanteen mukaan.

- 5 Edellä esitetyt keksinnön suoritusmuodot ovat luonnollisesti esimerkinomaisia eikä niillä ole keksintöä rajoittavaa vaikutusta. Tiedonsiirtojärjestelmiä, joihin keksintö on edullisesti sovellettavissa, ovat esimerkiksi toisen sukupolven digitaalisen matkapuhelinjärjestelmät kuten GSM ja sen laajennukset, PDC (Personal Digital Cellular), D-AMPS (Digital Advanced Mobile Phone System) ja PCS (Personal Communications Services) sekä tulevat kolmannen sukupolven digitaalisen solukko-
- 10 radiojärjestelmät kuten UMTS (Universal Mobile Telecommunications System) ja IMT-2000 (International Mobile Telecommunications at 2000 MHz).
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### Patenttivaatimukset

1. Tiedonsiirtojärjestelmä (100, 300), joka käsittää tukiasemia (101) tiedonsiirtoyhteyksien tarjoamiseksi liikkuville päätelaitteille (104), **tunnettu** siitä, että se käsittää ainakin yhden paikallisen palvelualueen (111) sekä välineet (108, 109) tietyille  
5 päätelaitteelle tiedonsiirtojärjestelmän aloitteesta tarjottavan palvelutarjonnan muuttamiseksi vasteena tietoon kyseisen päätelaitteen saapumisesta mainitulle paikalliselle palvelualueelle.
2. Patenttivaatimuksen 1 mukainen tiedonsiirtojärjestelmä, **tunnettu** siitä, että se käsittää palvelupalvelimen (108) päätelaitteiden sijaintia paikallisilla palvelualueilla  
10 koskevien tietojen ylläpitämiseksi ja päätelaitteille tarjottavan palvelutarjonnan muuttamista koskevien pyyntöjen generoimiseksi sekä sovelluspalvelimen (109) erilaisten palvelujen tarjoamiseksi päätelaitteille vasteena palvelupalvelimen generoimaan palvelutarjonnan muuttamista koskevaan pyyntöön.
3. Patenttivaatimuksen 2 mukainen tiedonsiirtojärjestelmä, **tunnettu** siitä, että  
15 mainittu palvelupalvelin on sama kuin mainittu sovelluspalvelin.
4. Patenttivaatimuksen 1 mukainen tiedonsiirtojärjestelmä, **tunnettu** siitä, että se on järjestetty muuttamaan tietyille päätelaitteelle tarjottavaa paikallista palvelutarjontaa vasteena päätelaitteen lähettämään ilmoitukseen (203) saapumisestaan tietyille  
paikalliselle palvelualueelle.
- 20 5. Patenttivaatimuksen 1 mukainen tiedonsiirtojärjestelmä, **tunnettu** siitä, että se on järjestetty havaitsemaan päätelaitteen saapuminen tietyille paikalliselle palvelualueelle ilman päätelaitteen lähettämää erillistä ilmoitusta saapumisestaan tietyille paikalliselle palvelualueelle.
- 25 6. Solukkoradiojärjestelmän päätelaite, joka käsittää ohjauslohkon (401) ja muistivälineet (402, 403), **tunnettu** siitä, että mainitut muistivälineet on sovitettu tallentamaan tarvittavat tiedot (407, 408) tietyn paikallisen palvelualueen tunnistamiseksi, jolloin päätelaite on järjestetty - vasteena paikallisen palvelualueen tunnistamiseen - lähettämään ilmoitus (203) saapumisestaan kyseiselle paikalliselle palvelualueelle,  
mainitun ilmoituksen ollessa tarkoitettu herätteeksi päätelaitteelle tarjottavan palvelutarjonnan muuttamista varten.
- 30 7. Patenttivaatimuksen 6 mukainen päätelaite, **tunnettu** siitä, että mainitut muistivälineet sijaitsevat irrotettavassa muistiyksikössä (403).

8. Menetelmä päätelaitteelle tarjottavan palvelutarjonnan muuttamiseksi tiedonsiirtojärjestelmässä, joka käsittää tukiasemia tiedonsiirtoyhteyksien tarjoamiseksi liikkuville päätelaitteille, **tunnettu** siitä, että se käsittää vaiheet, joissa
- muodostetaan tieto tietyn päätelaitteen saapumisesta tietyllä paikallisella palvelualueella (203) ja
  - muutetaan kyseiselle päätelaitteelle tiedonsiirtojärjestelmän aloitteesta tarjottavaa palvelutarjontaa (205).
9. Patenttivaatimuksen 8 mukainen menetelmä, **tunnettu** siitä, että tieto tietyn päätelaitteen saapumisesta tietyllä paikallisella palvelualueella muodostetaan vastaanottamalle päätelaitteelta viesti (203), joka ilmaisee päätelaitteen havainneen olevansa paikallisella palvelualueella.
10. Patenttivaatimuksen 8 mukainen menetelmä, **tunnettu** siitä, että tieto tietyn päätelaitteen saapumisesta tietyllä paikallisella palvelualueella muodostetaan vertaamalla päätelaitteiden tunnistetta tietyssä rekisterissä (304) olevaan luetteloon niiden päätelaitteiden tunnistesta, joille kyseinen paikallinen palvelualue on määritely.
11. Patenttivaatimuksen 10 mukainen menetelmä, **tunnettu** siitä, että mainittu vertaaminen tapahtuu tietyssä rekisterissä (304) ja mainittu päätelaitteelle tiedonsiirtojärjestelmän aloitteesta tarjottavan palvelutarjonnan muuttaminen tapahtuu tietyssä toisessa tiedonsiirtojärjestelmän laitteessa (305), kun tieto vertaamisen tuloksesta on välitetty mainitusta rekisteristä (304) mainittuun toiseen tiedonsiirtojärjestelmän laitteeseen (305).
12. Patenttivaatimuksen 8 mukainen menetelmä, **tunnettu** siitä, että vasteena tietoon tietyn päätelaitteen saapumisesta tietyllä paikallisella palvelualueella tarjotaan kyseiselle päätelaitteelle ennalta määrätty lisäpalvelu.
13. Patenttivaatimuksen 12 mukainen menetelmä **tunnettu** siitä, että mainittu lisäpalvelu on tiedotteiden lähettämistä päätelaitteelle.
14. Patenttivaatimuksen 8 mukainen menetelmä, **tunnettu** siitä, että vasteena tietoon tietyn päätelaitteen saapumisesta tietyllä paikallisella palvelualueella vähennetään kyseiselle päätelaitteelle tiedonsiirtojärjestelmän aloitteesta tarjottavia palveluja.
15. Patenttivaatimuksen 8 mukainen menetelmä, **tunnettu** siitä, että siinä
- välitetään päätelaitteen saapumisen tietyllä paikallisella palvelualueella ilmaiseva viesti (203) palvelupalvelimelle (108),

- tarkastetaan, minkälaisia palveluja kyseiselle päätelaitteelle on tarjottava kyseisellä paikallisella palvelualueella,
  - välitetään tarjottavia palveluja koskeva pyyntö (204) palveluja tarjoavalle sovellus-
  - 5 - palvelimelle (109) ja
  - välitetään sovelluspalvelimen tuottama palvelu (205) päätelaitteelle.
16. Patenttivaatimuksen 15 mukainen menetelmä, **tunnettu** siitä, että siinä
- välitetään tarjottavia palveluja koskeva pyyntö ainakin kahdelle palveluja tarjoa-
  - valle sovelluspalvelimelle ja
  - välitetään jokaisen sellaisen sovelluspalvelimen, jolle tarjottavia palveluja koskeva
  - 10 pyyntö on välitetty, tuottama palvelu päätelaitteelle.
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**(57) Tiivistelmä**

Tiedonsiirtojärjestelmä (100, 300) käsittää tukiasemia (101) tiedonsiirtoyhteyksien tarjoamiseksi liikkuville päätelaitteille (104). Se käsittää ainakin yhden paikallisen palvelualueen (111) sekä välineet (108, 109) tietyille päätelaitteelle tiedonsiirtojärjestelmän aloitteesta tarjottavan palvelutarjonnan muuttamiseksi. Muutos toteutetaan vasteena tietoon (203) kyseisen päätelaitteen saapumisesta mainitulle paikalliselle palvelualueelle.

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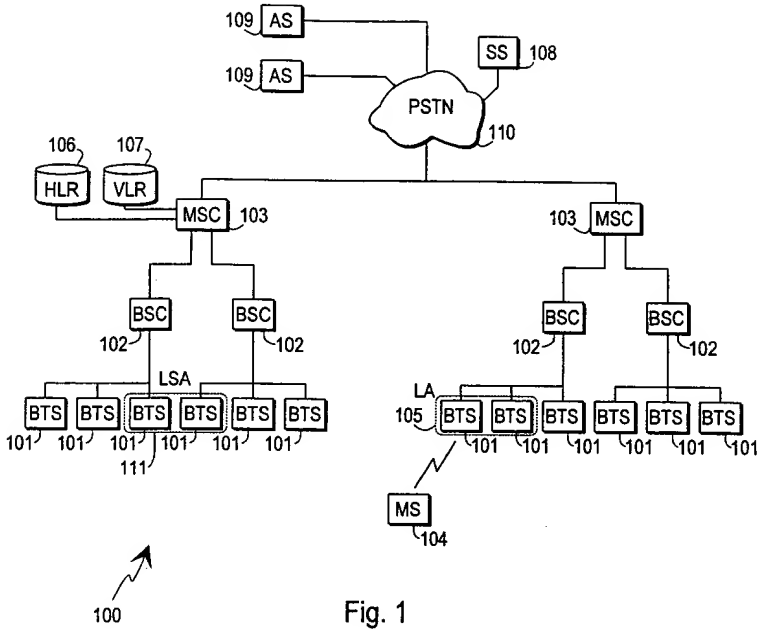


Fig. 1

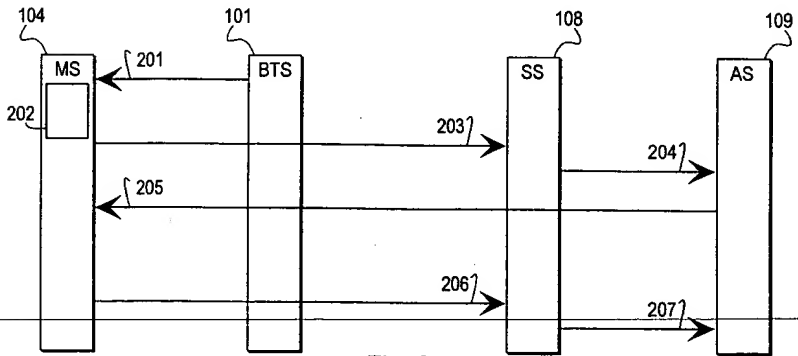


Fig. 2

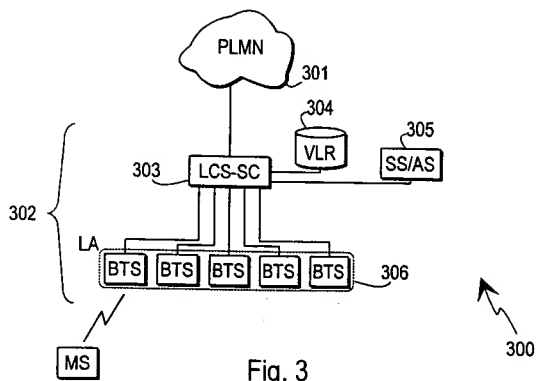


Fig. 3

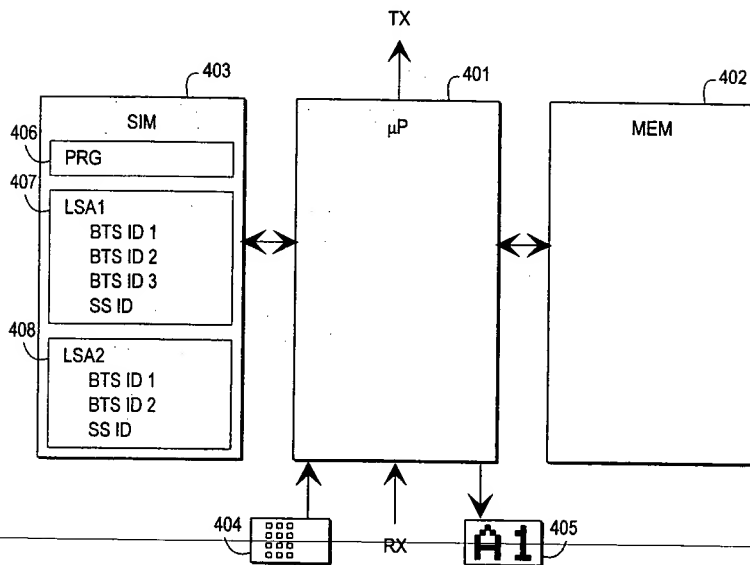


Fig. 4

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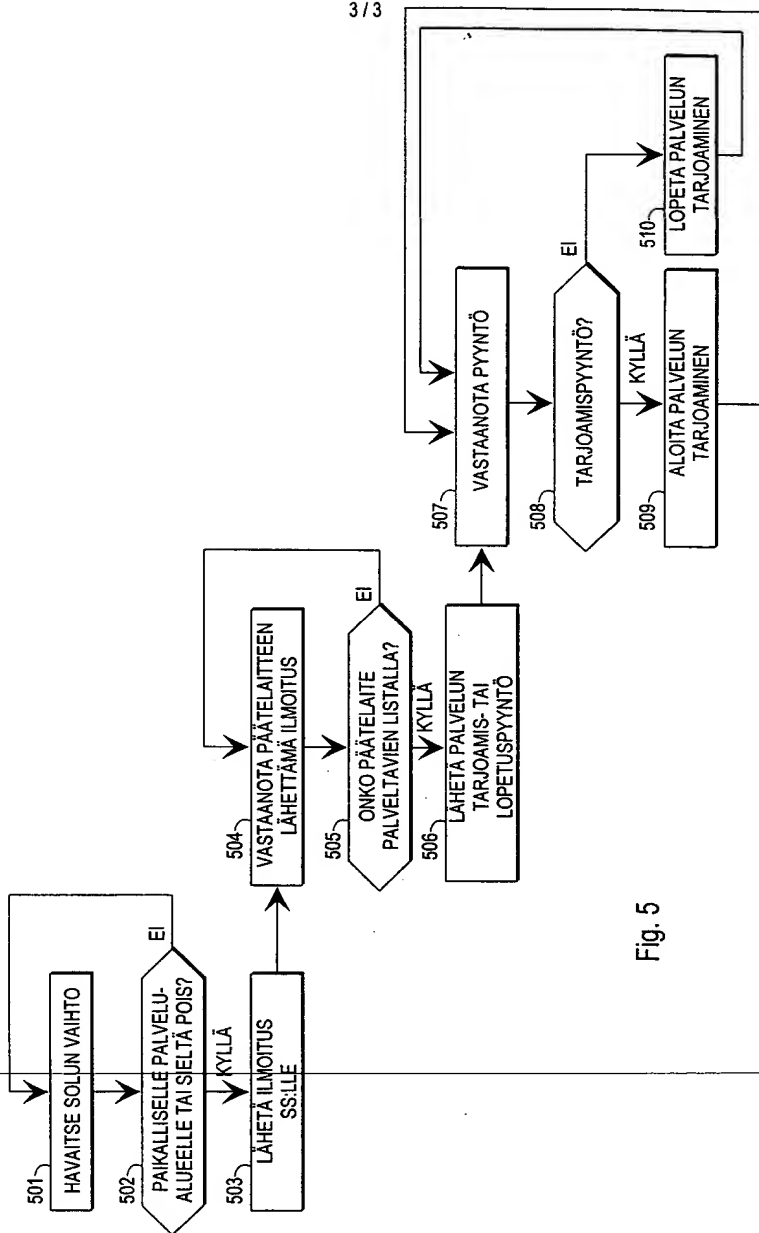


Fig. 5